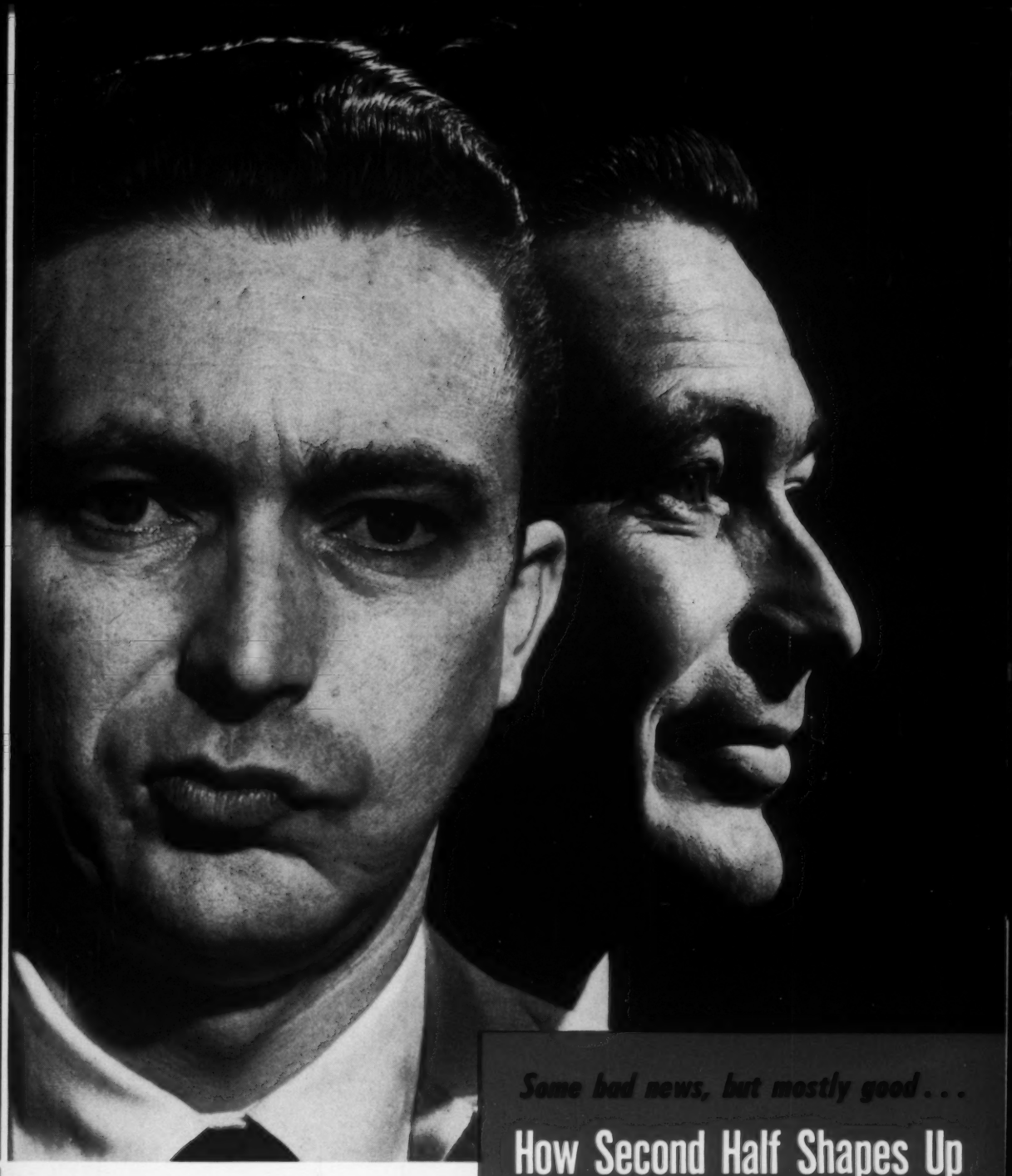
STEEL
The Metalworking Weekly
A PENTON PUBLICATION
JUNE 26, 1961



Some bad news, but mostly good . . .

How Second Half Shapes Up

Page 27

Auto Suppliers Will Buck Wage Hikes . 34

How to Improve Ball Bearing Life 64

The Dilemma in Nonferrous Scrap 95

METALWORKING WEEK — PAGE 17
COMPLETE CONTENTS — PAGE 19

MINIATURE GRINDING...

With A New Problem-Solving Internal

by Stuart St. John
Assistant Sales Manager
The Heald Machine Company

Seldom does any new machine represent all the answers to the desires of production people. But the new Model 090A and 0901A miniature internal grinding machines come mighty close. In fact, these new machines constitute a major break-through in the ability to control variables inherent to miniature internal grinding. This, in addition to substantially faster machine cycles, was made possible through a complete analysis of all miniature grinding techniques. Based on the findings of our research and development engineers, this machine was designed, produced and has proved its capabilities most convincingly. Here are some of these developments which have been incorporated in the new design and which have placed these machines well ahead of their time by present-day standards.

NEW models provide simpler, more reliable and infinitely adjustable wheel-wear compensation from 0 to .001 resulting in substantially longer wheel life.

NEW, lighter-weight vibration-damped cross slide on anti-friction ways gives concise and consistent repeatability.

SIMPLER, more efficient control and equipment arrangement permits easy service inspection through hinged doors at rear. No access necessary from either end.

NEW models feature a 75% reduction in hydraulic and electrical control equipment, simplified circuitry and ⅓ smaller electrical cabinet.

NEW feeding method gives greatly improved control of size and taper, increases accuracy by as much as 50%.

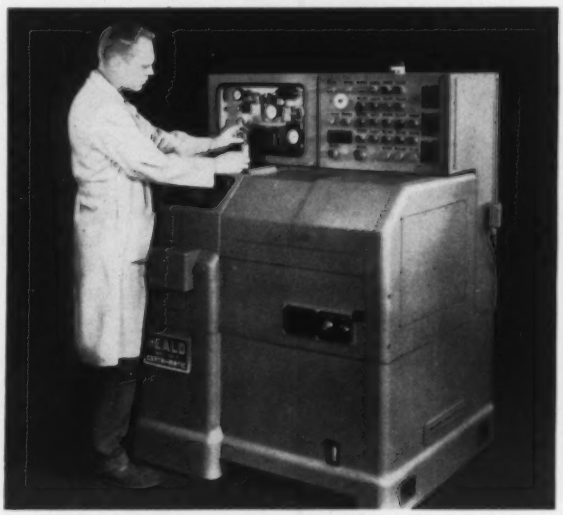
NEW direct-reading micrometer dials permit cross slide to be precisely positioned without use of dial indicators.

NEW cross slide resets automatically for wheel change; at press of button, machine automatically dresses wheel and re-enters cycle with resultant saving of operator time.

NEW direct-reading digital dial shows operator the amount of wheel life remaining at all times.

NEW, simpler, 3-piece guarding retains all coolant yet opens easily to expose complete machine.

These and other improvements make the 090A and 0901A miniature internals that challenge *any other machines* intended for this class of work. Your Heald engineer will be glad to arrange a demonstration for you.



Heald Model 090A precision internal, designed specifically for grinding miniature bores. Smallness of bore is limited only by the availability of small diameter wheels.

It PAYS to come to Heald

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

WORCESTER 6, MASSACHUSETTS

For strength
. . . economy
. . . versatility

Steel

NO LARGER GENERATOR SHAFT EVER FORGED ANYWHERE

Shipped recently to the General Electric Company's Large Steam Turbine Generator Department at Schenectady, N. Y., this shaft weighs 233,865 lb and measures 38 ft, 9½ in. long. The shaft will be machined and assembled by G. E. for a turbine-generator unit to serve Tennessee Valley Authority's Paradise Steam Generating Station at Paradise, Ky.

The 116-ton shaft was forged from a 120-inch diameter ingot that required the combined output of five electric-furnace heats, or roughly 260 tons of vacuum-poured, nickel-moly-vanadium steel. It was the largest ingot ever cast in a vacuum by Bethlehem. No larger generator shaft has ever been forged.

The generator shaft was fully heat treated and sonic tested. It has a maximum body diameter of 59¼ in.; minimum diameter of the forging is 11¼ in. The generator will operate at 1800 rpm, providing a maximum electrical output of 391,111 kva.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

Export Sales:
Bethlehem Steel Export Corporation

BETHLEHEM STEEL

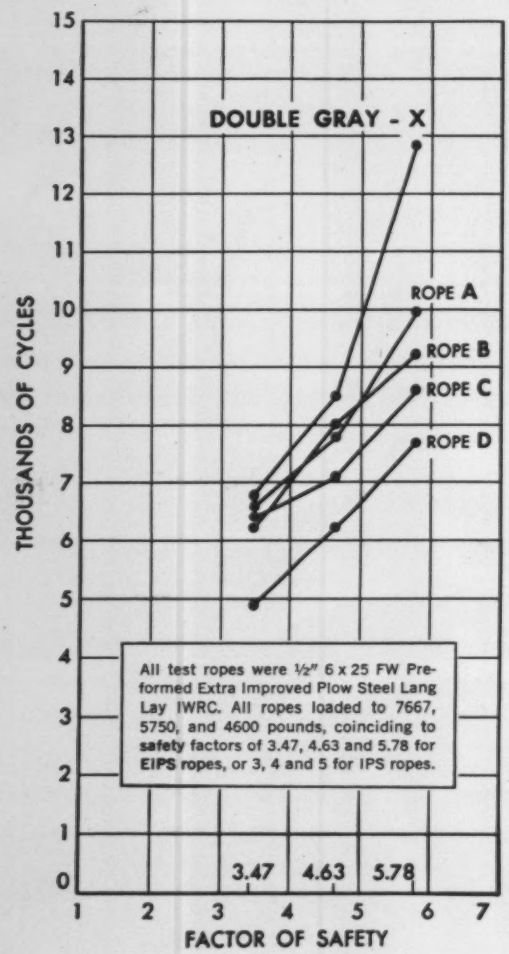
BETHLEHEM STEEL

DOUBLE GRAY-X® lasts longer

Tests prove CF&I-Wickwire's premium wire rope has 45%* more bending life than average of other ropes tested

In an extended series of tests conducted at CF&I's Palmer Plant, five brands of wire rope were tested to destruction on a 25,000-pound fatigue machine that bends wire rope back and forth over sheaves until it breaks.

All the ropes tested were made by major manufacturers, and were identical in size and specification. And all exceeded the catalog-breaking strength of extra-improved plow steel rope. But, as the chart indicates, one rope outlasted all the others at every safety factor used in the test. That rope was Double Gray-X!


DOUBLE GRAY - X
ROPE A
ROPE B
ROPE C
ROPE D
THOUSANDS OF CYCLES
FACTOR OF SAFETY
3.47
4.63
5.78
All test ropes were ½" 6 x 25 FW Preformed Extra Improved Plow Steel Lang Lay IWRC. All ropes loaded to 7667, 5750, and 4600 pounds, coinciding to safety factors of 3.47, 4.63 and 5.78 for EIPS ropes, or 3, 4 and 5 for IPS ropes.

At the highest and most commonly-used safety factor, CF&I-Wickwire's premium wire rope lasted 30% longer than the rope that survived next longest, and 68% longer than the rope that lasted the shortest length of time. Double Gray-X lasted 45% longer than the average of all other ropes tested at this safety factor.

Double Gray-X has greater resistance to bending fatigue, the chief enemy of wire rope life, because it is the result of a breakthrough in wire-drawing technology. The use of molybdenum disulphide in the drawing process produces these outstanding fatigue-resistance factors:

- A Molecular Shield . . . which prevents the wires from grinding together as the rope operates.
- Smoother Wire Surfaces . . . providing better resistance to fatigue.
- Extra Toughness . . . because molybdenum disulphide helps preserve the inherent toughness of the wire during drawing.

Double Gray-X can save you money because it lasts longer on even the most punishing jobs, as proved by these tests and by field reports from satisfied users. This longer-lasting wire rope cuts repair and replacement costs, lowers your total wire rope investment and reduces machine downtime. Use the wire rope of *tomorrow* today! Ask your CF&I salesman for complete details.

*Percentage above average of all other wire ropes tested at safety factor of 5.78.

The Colorado Fuel and Iron Corporation
Denver • Oakland • New York
Sales Offices in All Key Cities

Weirton Steel installs Wean Trimming Line for more efficient tinplate operation

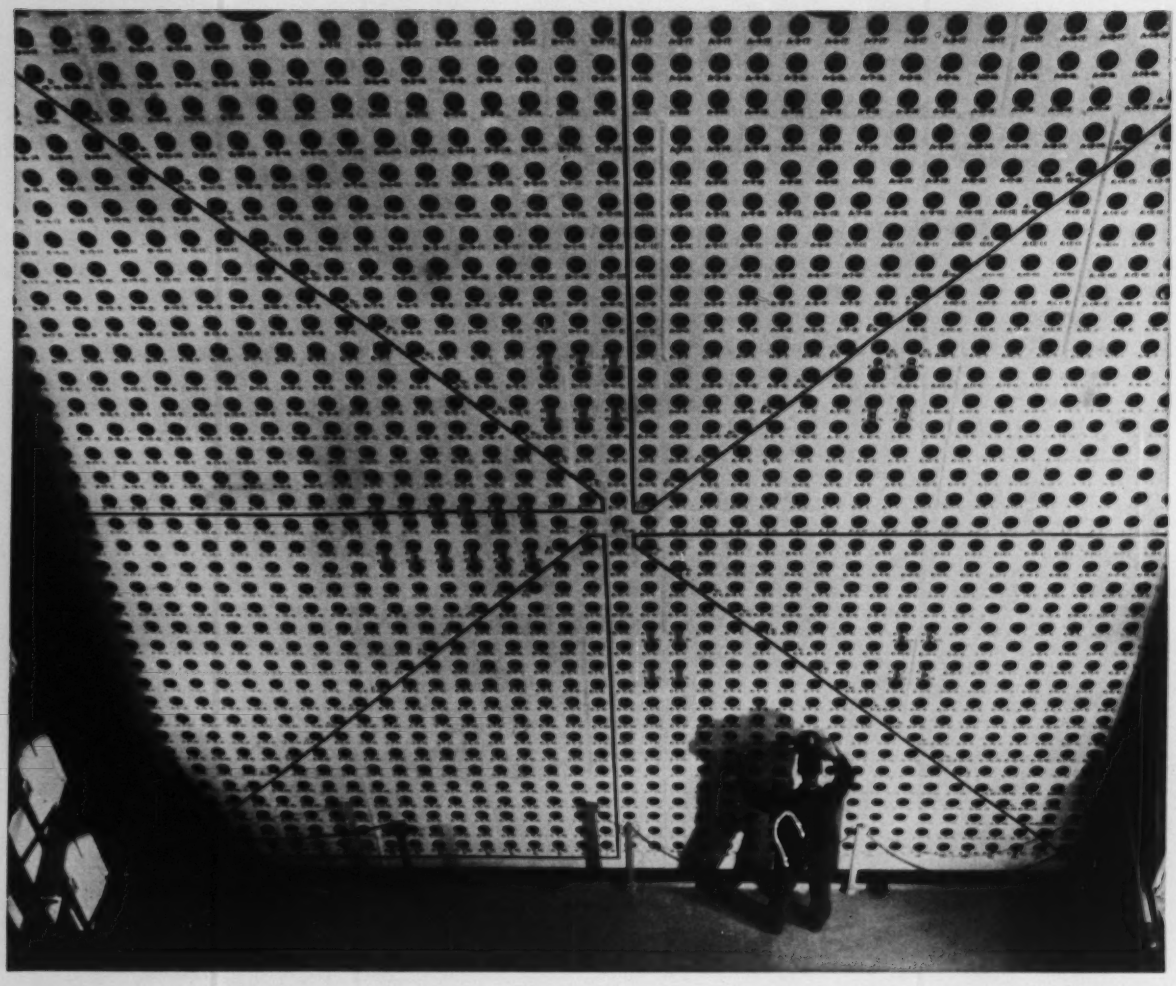
Weirton Steel Company Division of National Steel Corporation recently installed this new Wean side trimming line to increase efficiency in its tinning operations. After the plate has been tempered to customer specifications, it is moved to the Wean tension-type line for final trimming. This advance preparation of coils provides larger, evenly wound coils for the electrolytic tinning line.

The Wean side trimming line has a maximum speed of 4,000 feet per minute and is able to handle 60,000 pound coils 18 to 45 inches wide. Inside diameter of the coils is 16½ inches; maximum outside diameter is 85 inches. Many new design features are incorporated to side-trim coil to accurate widths at high speed.

To improve the efficiency of your tinplate production, call upon a Wean representative to help you plan your requirements. Wean's "creative engineering" has played a vital role in the development of over 75% of the continuous tinplate processing lines in operation today.

WEAN

THE WEAN ENGINEERING COMPANY, INC. • WARREN, OHIO



PRECISE TUBING HELPS CONTROL ATOMIC REACTOR

In the intense heat and radioactivity of nuclear reactors, there are many uses for precise tubing, manufactured under rigid quality control.

This is one of the many important applications for BISHOP'S complete line of tubing up to 1 inch OD, in stainless, nickel, super and exotic alloys—and glass-to-metal sealing alloys, clad metals and composite wires.

BISHOP also produces a vast line of platinum products and chemicals.

And BISHOP is unique because of its ability to *work these metals to such small, precise forms.*

Write for Bulletin No. 12, tubular products; or Catalog No. P-6, platinum products.

BISHOP

Tubular Products Division **J. BISHOP & CO.** *platinum works* MALVERN, PENNSYLVANIA

A JOHNSON MATTHEY ASSOCIATE "METALS FOR PRECISION AND PERFORMANCE"

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What's Ahead?

No pun is intended in connection with the heads we use for our cover (and for the column's art) this week. But what is ahead? The answers appear to the east of here on Page 29.

Associate Editor George Howick sent out 5000 questionnaires to metalworking managers all over the U. S. to get data that you can use in your planning.

Incidentally, we have been running these surveys for more than a decade at a twice-a-year clip. Only once have our managerial consultants called the wrong turn—at the beginning of 1958, when they missed predicting the recession.

Presidential Editors

Several of our editors are of presidential caliber. Examples:

- Associate Editor George Howick is president of the Cleveland Alumni Club of Bowling Green State University.
- Associate Editor Brian Wilson is chief executive of the New York Business Paper Editors Association, a group of about 75 in the metropolitan New York area.
- Associate Managing Editor Vance Bell is just finishing a term as president of the Northeast region of the Ohio School Boards Association. He'll be a trustee of the state organization beginning in 1962. Vance has double presidential caliber because he is also president of the school board of Avon Lake, Ohio. He has been a member of that body for 16 years.

Coming Up

Associate Managing Editor John Morgan and a task force of ten editors are hard at work preparing STEEL's fourth impact issue. We'll have more details on subject and date later.

Nearly 600 readers have requested more than 7800 copies of our last impact report, "Let's Stop Price Fighting." It's still available at $2 a copy (prices for larger quantities on request). The same is true for our first two studies, "Fight for Survival" and "People Power." Write June Schilens, Reprint Dept., STEEL, Cleveland 13, Ohio.

The Winner

Judges in our 1960 Usership contest tell us Harold C. Talling, sales manager, Urick Foundry Co., Erie, Pa., has won his second $500.

STEEL's article, "15 Ways Photography Pays Off" (Oct. 3, 1960, p. 50) gave him an idea for use of a camera in his plant. He was awarded the first $500 for his idea and the second $500 for submitting proof that it worked out.

Incidental Intelligence

Item: General Motors Corp.'s gross revenues in a year exceed the annual gross national product of Norway.

Item: Joseph Prendergast, director of the National Recreation Association, forecasts a 7 hour workweek within a century.

Item: In 1800, world population was 1 billion; in 1900, it was 1.5 billion; today, it is 2.5 billion. It will reach 5 billion by 2000.

Item: Men may have to start their civilization on the moon much as they started it here on earth—as cavemen. The moon has caves, or lava tunnels, and colonizers will have to use them as a refuge from deadly radiation.

Birth of a Company

Ever hear of a company that had its genesis as a department in a college? Morris Bean & Co., a foundry, was originally a part of Antioch College, Yellow Springs, Ohio.

Associate Editor Don Hammerstrom tells how it came about on Page 40.

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $3. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

TO FIND THE MAN YOU NEED . . .

Place an advertisement in the "Help Wanted" columns of STEEL's classified pages. Your advertisement will reach the qualified men you need, because STEEL is addressed to highly-trained men in all phases of metalworking.

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The Metalworking Weekly

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The Metalworking Weekly

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Fluid Power NEWS

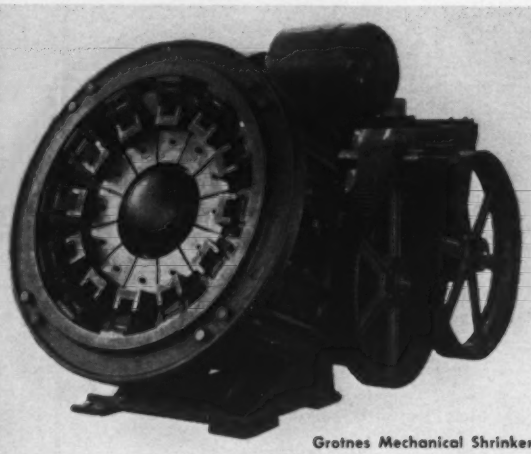
OILGEAR 40 Years of Fluid Power

Report No. 11,601 From Oilgear Application-Engineering Files

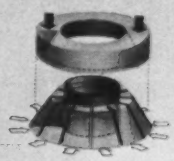
HOW OILGEAR HEAVY-DUTY POWER-PAKS EXTENDED WORKING RANGE OF GROTNES MACHINES

CUSTOMER: *The Grotnes Machine Works, Chicago, Illinois.*

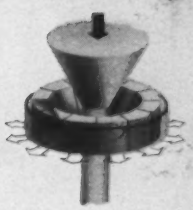
DATA: Grotnes expanders and shrinkers are used for forming and sizing sheet metal parts and heavy rings to tolerances of ±.002" without heat, machining, or waste. Any continuous cross-section part (square, round, oval, etc.) is expanded over jaws mounted in a slotted table. The jaws are moved radially outward by a drawbar-actuated cone, forming or sizing the part by stressing the metal beyond its yield point to induce a permanent set. In shrinking, the jaws are forced inward against the part by a tapered ring or toggle links. World-wide acceptance of this unique method has led to industrial requests for Grotnes machines with greater working forces, longer strokes, more uniform power than are practical or possible with mechanical drives using gear trains and crankshafts.



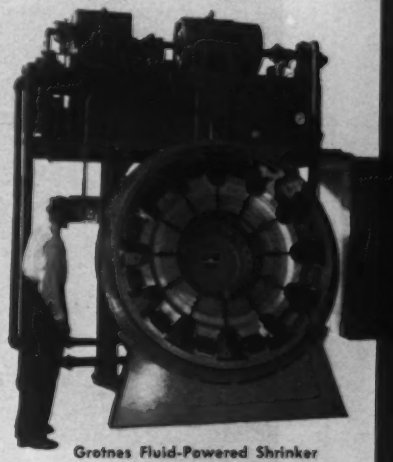
Grotnes Mechanical Shrinker



Grotnes Shrinking Method

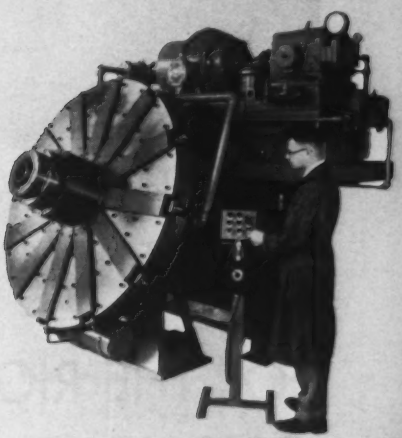


Grotnes Expanding Method



Grotnes Fluid-Powered Shrinker

SOLUTION: Shown above are two Grotnes shrinkers—one mechanically powered, the other Oilgear Fluid Powered for greater tonnage, longer stroke, more uniform power. Note the neat appearance of this new unit with its convenient, simple panel for precise, automatic control. Shown, right, is one of a new line of Grotnes expanders designed specifically for Fluid Power operation. Capacities range up to 1,580 tons on the new expanders; to 800 tons on the new shrinkers—based on 3,000 psi pressure provided by Oilgear application-engineered Heavy-Duty Power-Paks. Performance and control on these new, larger machines has been so outstanding that Grotnes is now equipping expanders as small as 25 tons drawbar pull with Oilgear Power-Paks. This is just one example of Oilgear cooperation and teamwork with designers and builders of machines for industry. An Oilgear Power-Pak is more than just a clean-appearing, unitized assembly of a pump, motor, reservoir, valves and controls . . . it is an efficient, leaktight, easy-to-install, Heavy-Duty Fluid Power system based on over 35 years of pioneering-engineering-knowledge that provides: automatic, electric power conservation; precision-controlled pressures, positions, cycle times; dependable operation; unit responsibility for the entire power system. Because of Oilgear's long reputation for dependable, trouble-free Fluid Power for virtually any application, Oilgear has become a name that all industry trusts . . . and uses.



Grotnes Fluid-Powered Expander

For practical solutions to <u>your</u> linear or rotary drive and control problems, call the factory-trained Oilgear application-engineer in your vicinity. Or write, stating your specific requirements, directly to:

THE OILGEAR COMPANY

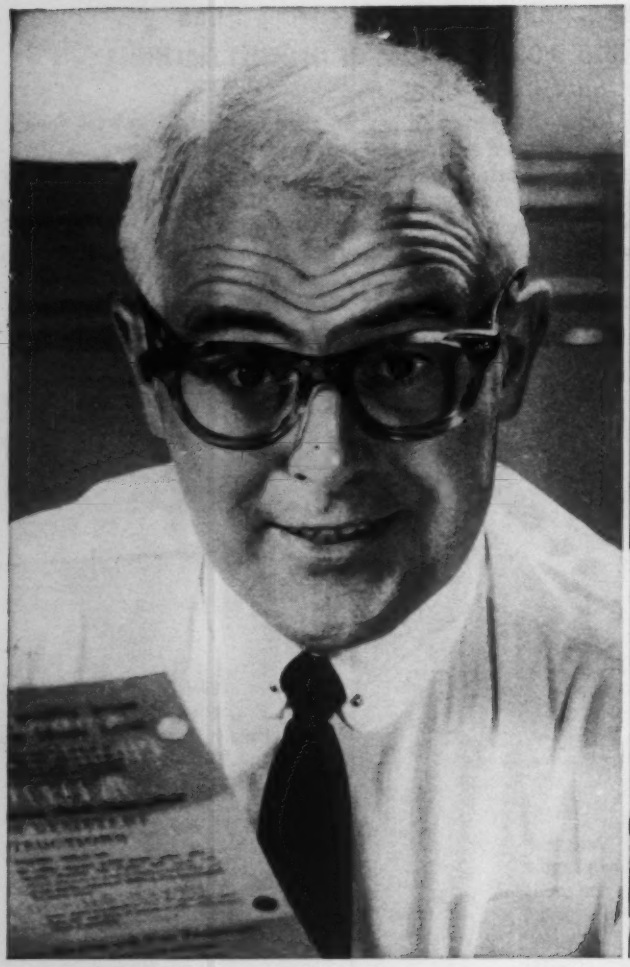
Application-Engineered Fluid Power Systems

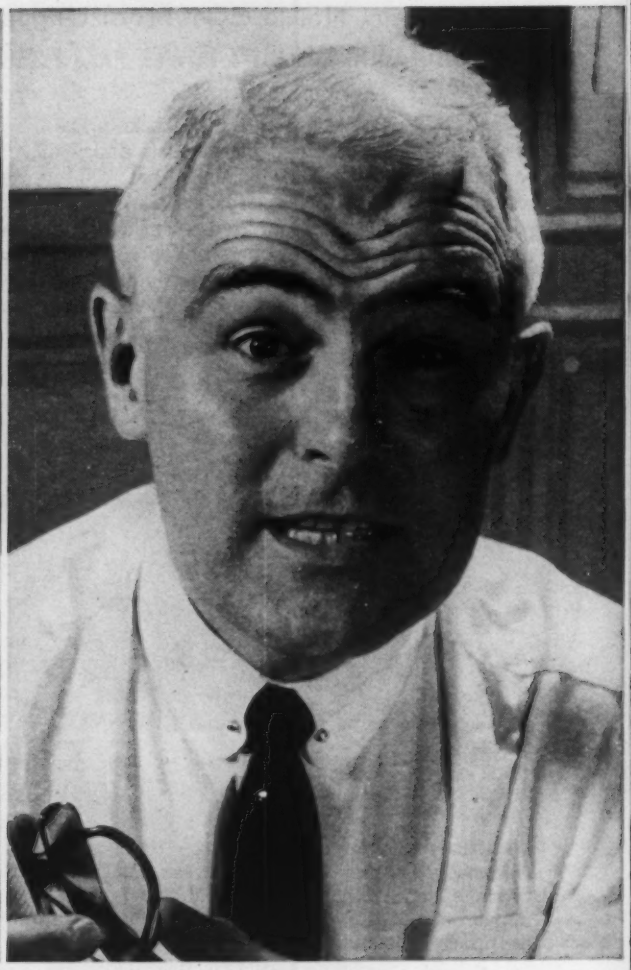
1572 WEST PIERCE STREET • MILWAUKEE 4, WISCONSIN

Oilgear application-engineered Power-Paks are also used extensively on hotplate, plywood, pulp-baling, injection molding, extruding, forming, and other presses. Oilgear rotary drive and control systems are equally well accepted in virtually every field of manufacturing and processing. For accurately controlled linear or rotary power . . . for the lowest cost per year . . . check with Oilgear!

GOODYEAR

Hose? Goodyear





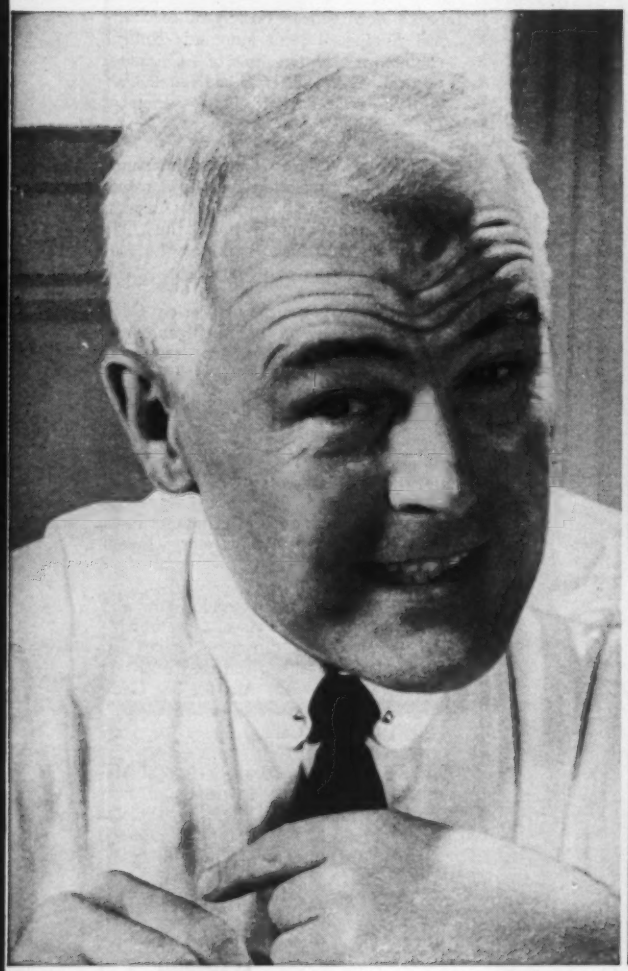
THE KIND I NEED?
(No matter how tough or unusual your application or what type hose it calls for—*Goodyear has the answer!)*

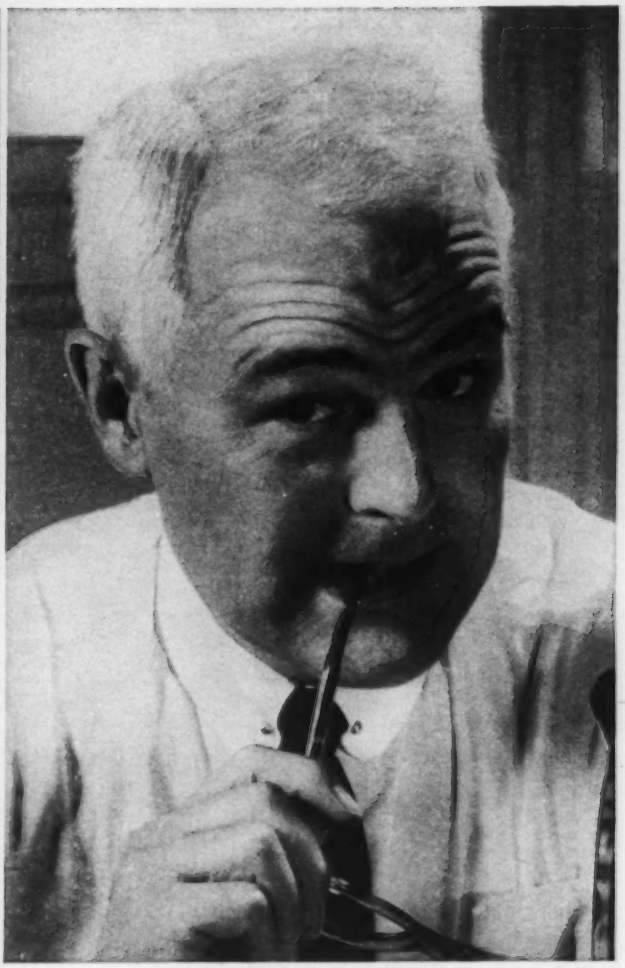
WHEN I NEED IT?
(When you need hose in a hurry—locally available right from distributor stocks—*Goodyear has the answer!)*

FOR THE RIGHT HOSE... AT THE RIGHT PLACE...
CALL YOUR GOODYEAR DISTRIBUTOR... first in

Lots of good things come from GOOD

Has All the Right Answers!





TOUGH AS I NEED IT?
(For the extra ruggedness, extra dependability and extra safety of real quality hose—*Goodyear has the answer!)*

SPECIAL HELP WHEN I NEED IT?
(Call for the advice of an expert like the G.T.M. – Goodyear Technical Man – and *Goodyear has the answer!)*

AT THE RIGHT TIME... AT THE RIGHT PRICE...
service with all industrial rubber products

Or write Goodyear, Industrial Products Division, Akron 16, Ohio

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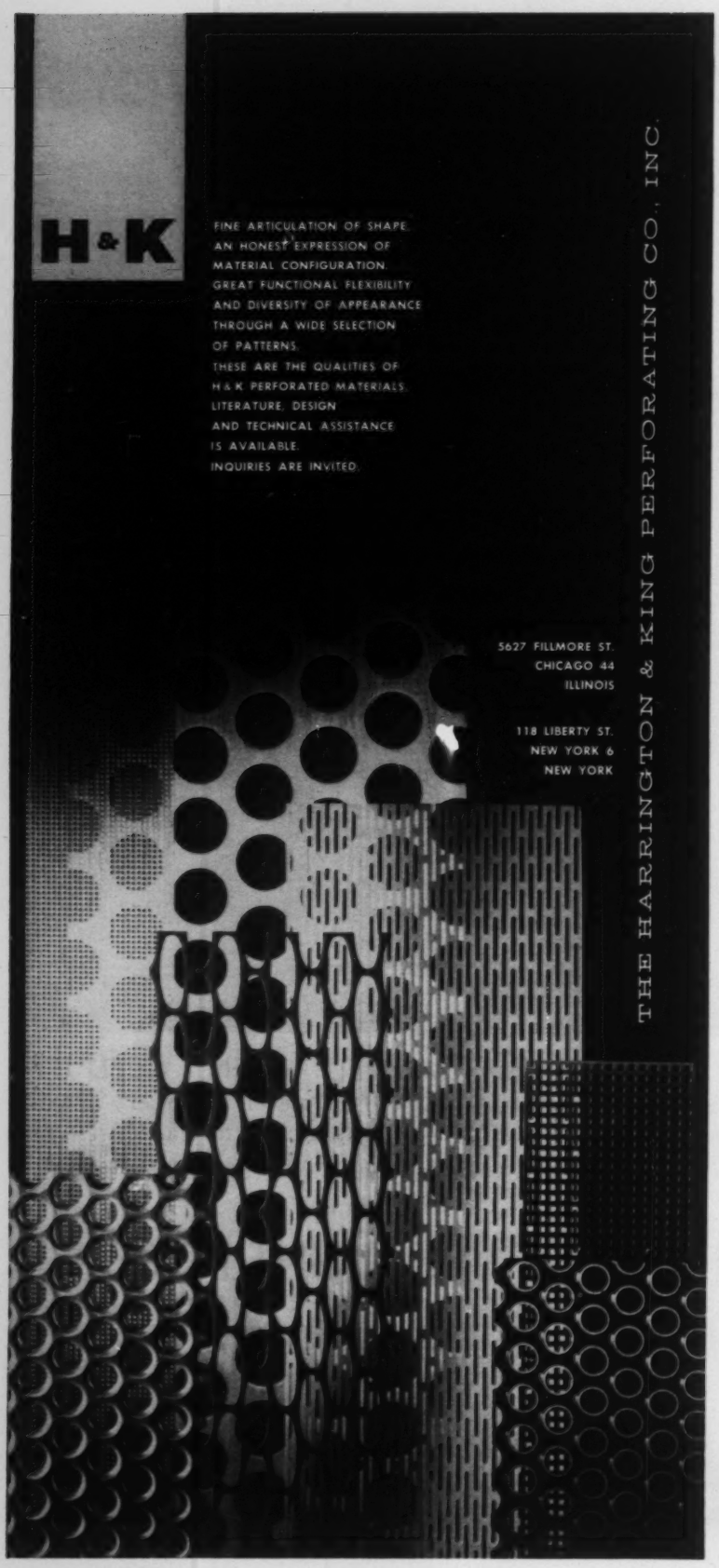


CALENDAR
OF MEETINGS

June 28-30, American Society of Mechanical Engineers: Joint automatic control conference, University of Colorado, Boulder, Colo. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

July 18-20, Western Plant Maintenance and Engineering Show and Conference: Pan Pacific Auditorium, Los Angeles: Information: Clapp & Poliak Inc., 341 Madison Ave., New York, or the San Francisco office, 681 Market St.

Aug. 15-17, Cryogenic Engineering Conference: University of Michigan, Ann Arbor, Mich. Conference secretary: K. D. Timmerhaus, Department of Chemical Engineering, University of Colorado, Boulder, Colo.

Aug. 16-19, Society of Automotive Engineers: National meeting, West Coast, Sheraton Hotel, Portland, Oreg. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: Joseph Gilbert.

Aug. 22-25, Western Electronic Show and Convention: Cow Palace, San Francisco. Convention director: Calvin K. Townsend. Business office: 1435 La Cienega Blvd., Los Angeles 35, Calif. Northern California office: 701 Welch Rd., Palo Alto, Calif.

Aug. 28-Sept. 1, American Society of Mechanical Engineers: International heat transfer conference, University of Colorado, Boulder, Colo. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

Sept. 10-12, Steel Service Center Institute: Great Lakes regional meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Institute's address: 540 Terminal Tower, Cleveland 13, Ohio. Executive vice president: Robert G. Welch.

Sept. 11-12, American Supply & Machinery Manufacturers' Association Inc.: Industrial distribution conference, Statler Hilton Hotel, Cleveland. Association's address: 2130 Keith Bldg., Cleveland 15, Ohio. Business manager: W. B. Thomas.

Sept. 11-13, American Mining Congress: 1961 mining convention, Hotel Olympic, Seattle. Congress' address: 1102 Ring Bldg., Washington 6, D. C. Executive vice president: Julian D. Conover.

Sept. 11-15, Society of Automotive Engineers: National farm, construction, and industrial machinery meeting and display, Milwaukee Auditorium, Milwaukee. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: Joseph Gilbert.

How to automate step by step

Automation means many things to many people . . . ranging from the simple sequencing of individual operations to the completely automatic system.

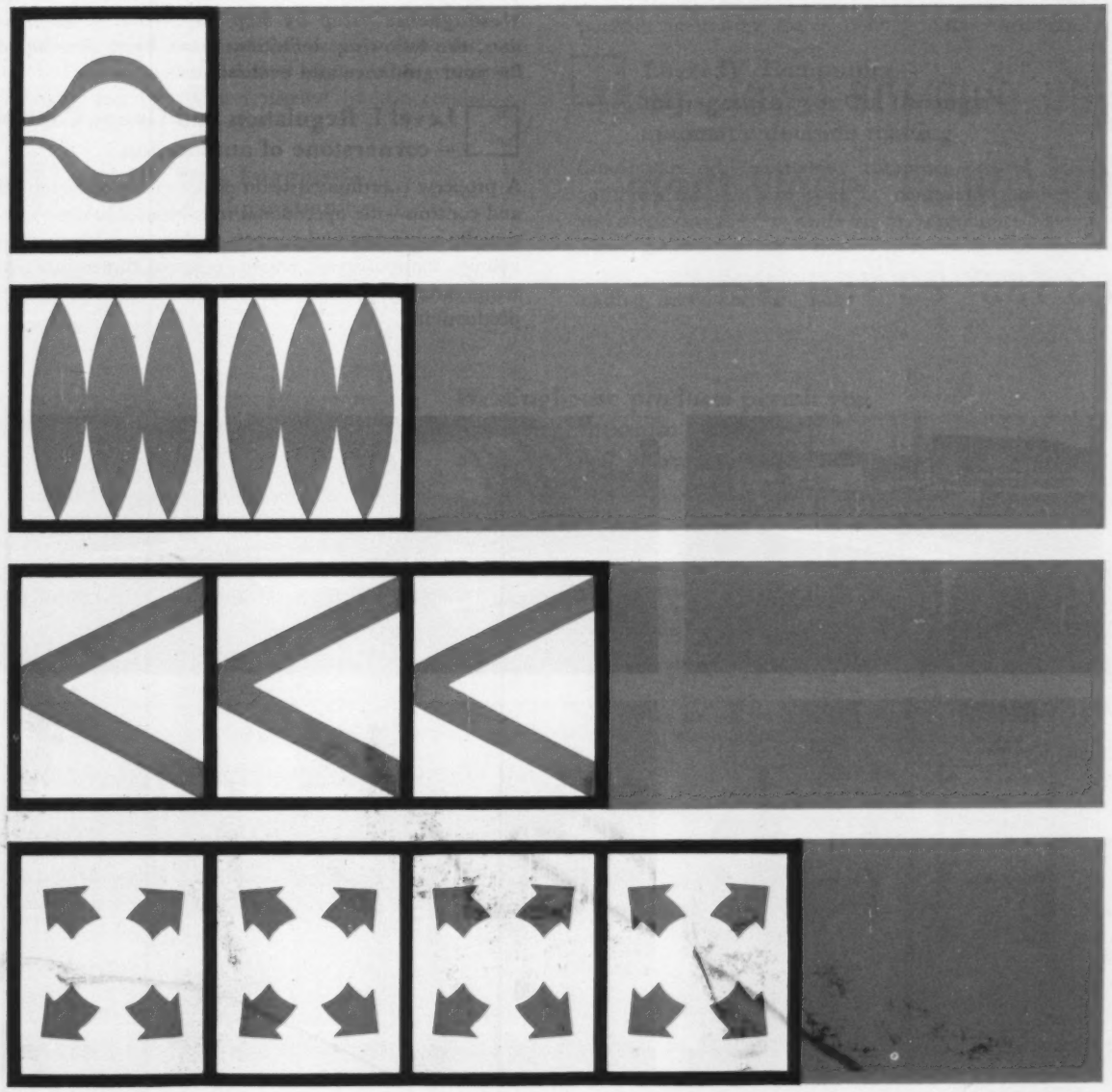
Westinghouse has chosen the term "Progressive Automation" to describe a step-by-step application and coordination of electric drive systems . . . executed in stages that are completely compatible to your cost-reduction, production quality and equipment modernization goals.

Such a step-by-step concept permits you to realize immediately higher mill rates, better steel quality and longer mill equipment life in those individual operations that are initially automated . . . and at the same time, moves you a big step closer to the full profit and production benefits of completely automated facilities.

Westinghouse, the leader in this field, is ready to work with you at whatever level you are currently concerned with . . . from simple process regulation to ultimate continuous decision-making computer control.

What level of Westinghouse's "Progressive Automation" meets your current needs best? Let's examine the definitions on the following pages . . .

Westinghouse



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Level II. Programming—the right action at the right time automatically

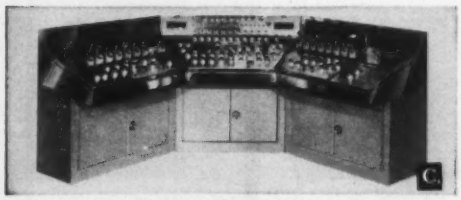
Pre-selection, by means of information contained on punched cards, tapes or manual setups, of the sequence of events and information needed by the regulating system, to control the process.

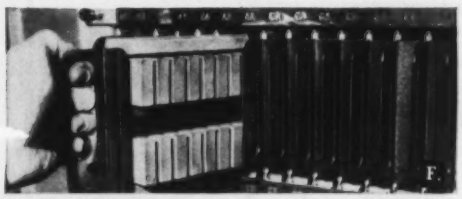
Level III. Data Logging—fast, precise information

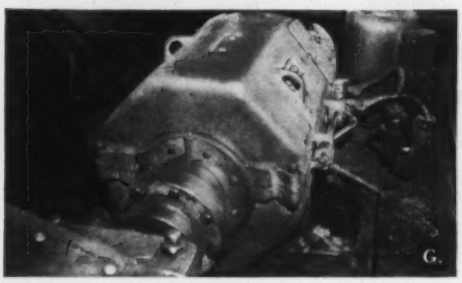
Automatic collection and storage of operating and process information for use when needed—in the form needed. Data logging and display can provide immediate production data for quality control, etc., can record information required to re-program, and can operate as part of a computer in monitoring and optimizing mill performance.

Level IV. Computing—management control through automatic decision making

Continuous decision-making computer control which optimizes the mill operation by constantly monitoring and correcting the programming and regulatory systems. These corrections are required because of changes in process elements, environmental conditions, equipment loading, and other variables.







Westinghouse products permit you to realize optimum results at every level of automation

A. Westinghouse Life-Line® motors and Moduline® gearing installed in cleaning section of 50-inch continuous annealing line.

B. Mill muscles are dependable Westinghouse motors with exclusive Thermalastic® insulation on armatures. This 12,000-hp twin drive is conservatively rated . . . designed for rugged rolling mill duty.

C. Typical operator's control pulpit for computer controlled mill.

D. Input portion of data accumulation system with manual switches on left—punched card reader on right.

E. Complete automatic mill operation is possible with Westinghouse on-line industrial Prodac* control computer.

F. Prodac module, representing a circuit function, is easily accessible for removal or replacement.

G. Westinghouse heavy-duty d-c mill motors provide power for toughest applications. On steel mill screwdowns, improved field coil design adds more copper for greater capacity and longer life.

For other considerations affecting your use of Westinghouse *Progressive Automation*, see the next page . . .

*Trademark

Westinghouse

How to apply Progressive Automation to your mills

Exactly where and how can you begin to blue-print your over-all automation plan that will reap all these benefits for your production? The best answer is to begin with the best qualified scource: Westinghouse, who has designed, built and installed more automatic production systems in steel mills than any other manufacturer.

Westinghouse—one source, one responsibility

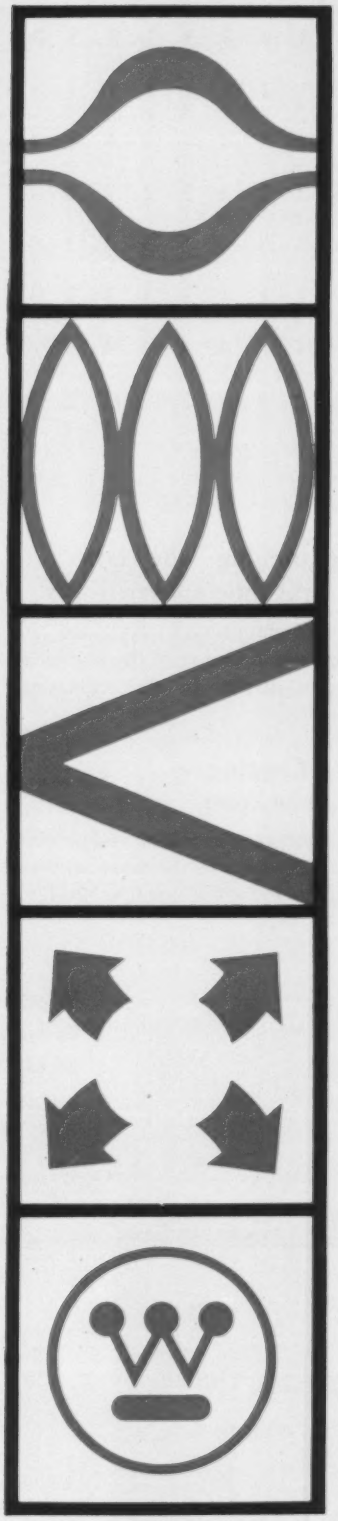
Westinghouse experience, facilities, engineering talent and equipment add up to your assurance of:

1. A sound analysis of your automation needs to determine the automatic systems best suited to your processes.
2. A coordinated systems approach of motors and controls, thoroughly engineered and completely tested, which integrates the stages of automatic production you need.
3. An automatic control system designed for application to your mill in line with the Westinghouse concept of *Progressive Automation.*
4. The use of the latest automation techniques and components—all adaptable to future developments and needed expansion.
5. A single source, a single responsibility for complete automation systems and related electrical equipment.

These complete Westinghouse facilities are available to you. Call your nearby Westinghouse representative, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania.

You can be sure . . . if it's Westinghouse

Westinghouse



Interested in more information on Westinghouse Progressive Automation for the steel industry? Write for B-8220, a complete set of new brochures describing Automation "steps" in detail as they relate to steelmaking operations. You can reserve a set for your use by indicating your area of interest on your company letterhead and mailing it to: Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

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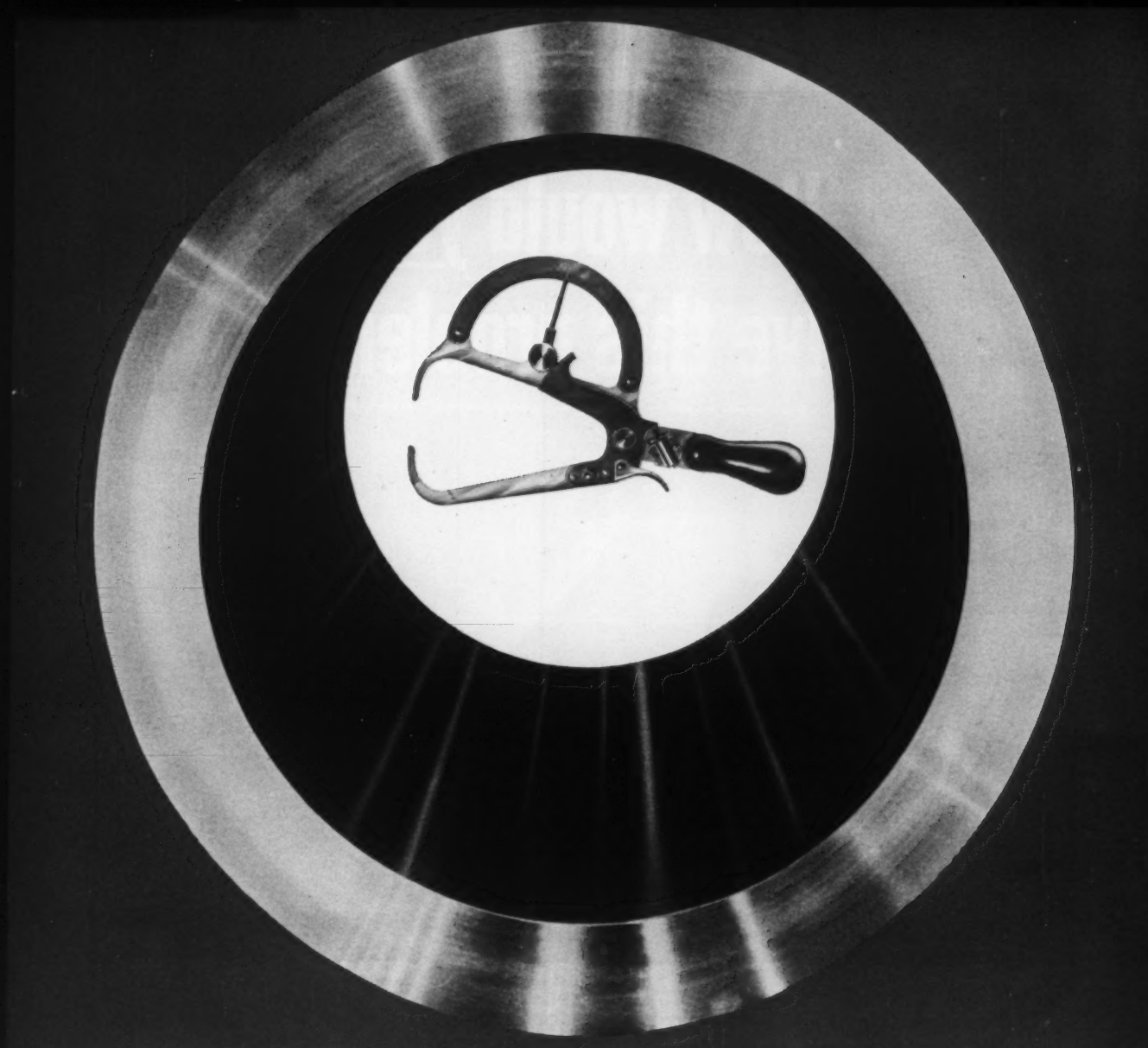
STEEL



NEW SIZE RANGE SURPRISE!

HERE'S A NEW PROCESS in centrifugally spun tubing that offers you greater freedom in design. It's ACIPCO CERAM-SPUN®... the new ceramic mold process* that is not limited by equipment sizes!

NOW, YOU CAN ORDER almost any combination of sizes you require. ACIPCO CERAM-SPUN® tubes offer O.D.'s from 2.25" to 50"; and wall thicknesses from .25" to 8". As-cast lengths are furnished from 4 feet to 20 feet, longer lengths are made by welding.

THINK OF HOW MUCH this process can save you! You'll avoid the cost of unnecessary metal waste, and excessive machining charges. And ACIPCO's complete "under one roof" operations — including heat treating, machining and welding — offer many additional economies. No need for the delays and excessive costs that often result in buying from multiple sources.

If you design, manufacture or use tubular component parts, it will certainly pay you to investigate the versatility of ACIPCO CERAM-SPUN® tubing and the flexibility of ACIPCO's integrated facilities. Contact **ACIPCO STEEL PRODUCTS,** Division of American Cast Iron Pipe Company, Birmingham 2, Alabama.

*Patent applied for

ACIPCO CERAM-SPUN®
STEEL TUBING

How would you solve this problem?

This roller-end component was produced from cold finished bar stock. During machining of the close-tolerance load-bearing surface, these problems were encountered: frequent tearing sent reject rate sky-high, slowed down production—and tool life was abnormally short.

A Ryerson Metalogics specialist analyzed the problem and suggested Ledloy® 375, world's fastest machining steel. This proved an excellent choice—rejects virtually vanished. Ledloy 375 boosted tool life . . . cut machine down-time . . . permitted increased feeds . . . and gave a better finish.

And here's why Ledloy steels from Ryerson assure you of top machinability with consistency. No two mills get the same results in steelmaking. So Ryerson buys all Ledloy "hot stock" from just *one* mill. Their exacting quality standards, and our own rigid controls, assure you top machinability—consistently.

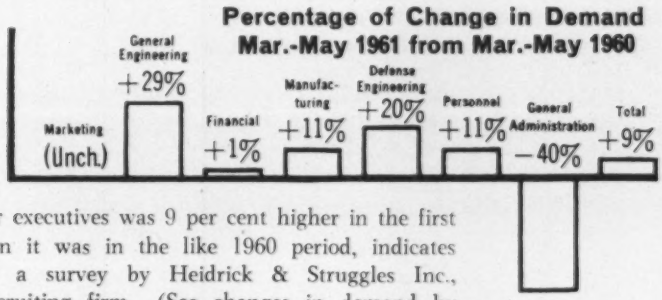
Ask your Ryerson representative to help you value-analyze your production problems. You'll get unbiased recommendations on free-machining steels of every kind—as well as aluminum and industrial plastics. Be Metalogical—call Ryerson.

RYERSON

JOSEPH T. RYERSON & SON, INC., MEMBER OF THE INLAND STEEL FAMILY

METALOGICS PLUS VALUES IN STEEL • ALUMINUM • PLASTICS • MACHINERY

Executive Demand Rises



Demand for executives was 9 per cent higher in the first quarter than it was in the like 1960 period, indicates Executrend, a survey by Heidrick & Struggles Inc., Chicago recruiting firm. (See changes in demand by functions above.)

Block Sees Lull, Then Improvement

Improvement in steel industry operations after a lull this summer was forecast last week by Joseph L. Block, chairman, Inland Steel Co. He said the recent outgrowth of price cutting in the steel industry would not materially affect his firm's earnings. Inland is a major factor in only one of the items so far hit by price cuts—reinforcing bars. He said: "I don't think it's likely that there will be any price cutting" in sheets, plates, and shapes. He pointed out that small mills have been cutting prices on low tonnage items for "quite a long time," as STEEL reported (Jan. 16, p. 17). "We think by and large steel prices are too low," he said, but he pointed out that recent cuts "certainly are not helping" prospects for a price hike later this year. Steel industry labor contracts call for a wage increase Oct. 1.

Norge's Sayre Sees Appliance Upturn

Sales of major home appliances will be strong in the second half and top last year's total of 16 million units by 2 to 5 per cent, asserts Judson S. Sayre, chairman, Norge Div., Borg-Warner Corp. He points out that industry inventories of both automatic washers and refrigerators have been pared. They stand at 150,000 units less than at this time a year ago. Orders are running consistently better than they were a year ago, and prices are stable, he says.

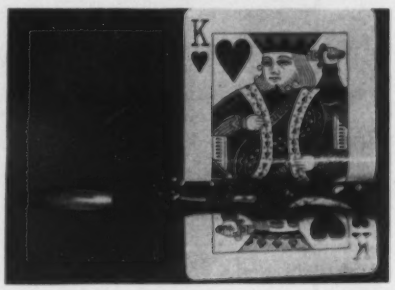
AMF Exec Urges Campaign for Free Trade

Even though this year U. S. exports will exceed imports by around $6 billion, "the voice of the protectionist is heard louder and louder in the land." There is "a tremendous countereducational job to be done to establish simple truths, such as . . . you can't sell your exports unless you import . . . and for every job saved by a higher tariff, one or more is lost in an export industry when

other countries retaliate." So said Frank X. White, president, AMF International Co., subsidiary of American Machine & Foundry Co., at a meeting of the Association of Industrial Advertisers. He suggested that for industries which cannot compete, for structural reasons beyond their control, we don't need "protection but government programs to facilitate the shifting of capital and people thus employed into other lines of activity."

Look What You Can Do with High Speed Photography

The king of hearts is being cut by a 30 caliber rifle bullet traveling at 2800 ft per second. It was "stopped" in this photo by Harold E. Edgerton of Edgerton, Germeshausen & Grier Inc., Boston photo research firm and designer of special photo equipment. High speed photography will stop hummingbirds in flight.



Tin Prices Soar to Eight Year High

Tin prices soared to an eight year high last week on the heels of widespread speculation that Free World consumption will outrace production by 10,000 to 20,000 tons this year. At STEEL's press time, Straits tin in New York was quoted at $1.17 a pound and no one was willing to predict when the spiral would end. Adding to the confusion, the International Tin Council's buffer stock manager withdrew from the market as a seller—leading to speculation that the 10,000 tons of metal in stock had been exhausted.

780,000 Grains on a Tack Head

Finer than gunpowder, 780,000 grains of atomized aluminum rest on the tack head next to the needle in the photo. U. S. rocket flights will burn up 35 million lb of the powder annually by 1965, predicts Edward F. Reilly, market manager, Reynolds Metals Co. The powder is already used to pep up fuels for such rockets as Polaris, Pershing, Scout, and Mace. Mr. Reilly says all uses will demand about 50 million lb of the powder by 1965 vs. 12.4 million in 1960.

Oxygen Steel Plant Will Be Controlled by Computer

Great Lakes Steel Corp., a division of National Steel Corp., will install computers to control giant, basic oxygen furnaces at its Detroit plant. Operations are scheduled to begin early next year. Thompson Ramo Wooldridge Inc. will supply the computer which will control the quantity and chemical composition of the steel produced. The computer will also determine additives required, control the heat generated, insure consistent operating practices, minimize waste of oxygen and raw materials, and assure an optimum production rate. It will also "learn from experience" and update itself automatically as more is learned about the furnace's operating characteristics.

A Better Second Half in Store

This character's expression indicates that he has just read the result of STEEL's midyear survey on second half business prospects. He has learned that the consensus of metalworking managers is that dollar volume of sales in the second half will be 7 per cent above the first half volume. They look for total 1961 volume to be 3 per cent above the 1960 total. Profits will not keep pace; costs will rise at a slower rate than in recent years (see Page 29).

Dillon Hints Tax Cut in Booming '62

Treasury Chief Douglas Dillon went on record last week with a prediction that 1962 will bring an 8 per cent increase in gross national product (over the '61 mark) and that it would be in the "course of events to expect" a tax cut in 1962, with a surplus in the federal budget for fiscal 1963 (which begins July 1, 1962). Mr. Dillon figures GNP will run $515 billion in 1961 and $555 billion in 1962. He expects it to reach an annual rate of $570 billion by 1962's final quarter. Tax cut recommendations will be matched by closing unnamed "loopholes" in our tax structure.

Dillon O.K.'s Revised Tax Incentive Plan

Treasury Secretary Dillon, as predicted (STEEL, June 19, p. 17), officially endorsed a revision to the Surrey plan for investment incentives. He expects to see legislation from Congress this session and reports he will be satisfied to leave the decision on the best way to encourage capital investment up to Congress. That means a 7 or 8 per cent across-the-board tax credit on new investment, Congressional sources say.

She's 'Sewing' with Ultrasonics

You can "sew" synthetic fabrics without thread, heat, or adhesives on this Sonoseal ultrasonic sewing machine made by International Ultrasonics Inc., Cranford, N. J. The device can bond plastics to each other or to cardboard, paper, or fabrics made from natural fibers. The company has also unveiled a similar machine for industrial plastic bonding applications, and a hand spotwelder for plastics that works somewhat like a stapling gun.

New Semiconductor Developed

Atomics International Div. of North American Aviation Inc. has developed, under an Atomic Energy Commission contract, a new superconductor material that offers "no resistance" to electrical current. The material, which can be "easily coiled," has been drawn into wire. At −452° F, the wire has conducted 100,000 amperes of electrical current per square centimeter in a moderately high magnetic field (30,000 gauss). The material is composed of three parts of columbium to one part of zirconium. It is

STEEL The Metalworking Weekly

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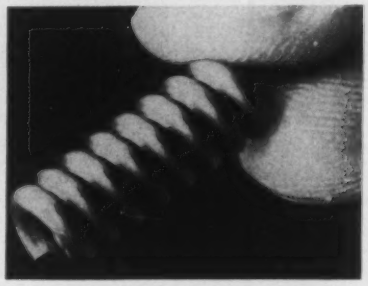
STEEL Editorial index available semiannually.

STEEL is also indexed by Engineering Index Inc. 29 W. 39th St., New York 18, N. Y.

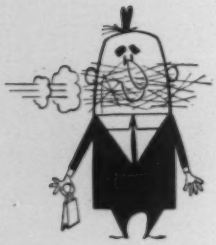
malleable and can be made into bars, strips, and other shapes without losing its superconducting properties.

New Stainless Wire Has 500,000 psi Tensile

National - Standard Co. has developed a new, stainless steel, spring wire with tensile strengths up to 100,000 psi higher than music spring wire. Guaranteed minimum tensile of 0.004 in., NS-355 is 500,000 psi. Minimum for the 0.195 in. variety is 290,000 psi. Suitable for compression and extension springs, the wire will likely find usage in jet engines.



Straws in the Wind



Durable goods orders in May rose 2 per cent above the April level (seasonally adjusted), bringing the order level 15 per cent above the January low, reports the Commerce Department (see Page 49) . . . The primary metals industry operated at 68 per cent of capacity in May vs. 61 per cent in April . . . Sen. Patrick McNamara (D., Mich.) has offered a bill to end the tax-exempt status of municipal bonds issued to lure industry from one area to another . . . Republic Steel Corp. has announced a new steel building, called Trusspan, which features pre-engineered sections that can be fitted together to form a wide variety of types and sizes. Erection is a matter of days . . . Applications for home loan guaranty and new construction starts under the GI loan program increased in May . . . The U. S. Council of the International Chamber of Commerce has announced its support of President Kennedy's proposal to set up a foreign aid agency with borrowing authority over at least a five year period, and it is urging that aid to developing nations include "encouragement of local enterprise and private foreign investment" . . . May sales by members of the National Industrial Distributors' Association rose 11 per cent above the April level, but they were 4.5 per cent below those in the year-earlier month . . . Weirton Steel Co., a division of National Steel Corp., will install the first facilities designed and constructed specifically for the production of lightweight tin plate; operation is to begin in mid-1962.

Metalworking Pulse

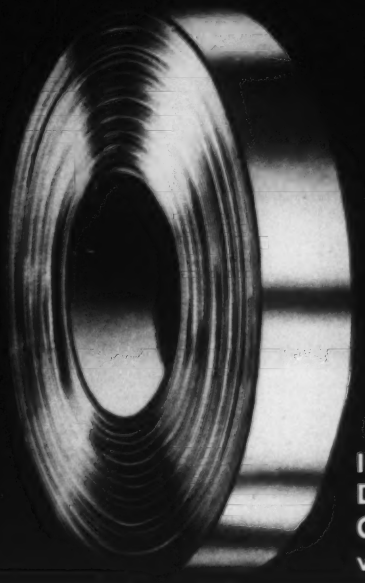
The Business Trend: For two weeks, STEEL's industrial production index has held at the 1961 high of 168. It's likely to inch a bit higher before the July 4 holiday week. **Autos:** Output has fluctuated in a narrow range around 128,000 units a week for several weeks. June turnout will total about 500,000 units for the second best month so far this year. **Steel:** Ingot output slipped below the 2 million ton level after four weeks above that mark.

- **INDUSTRIAL PRODUCTION INDEX**
  (1947-49 = 100)
  Week ended June 17 . . . 168†
  Year ago 159
  Details on Page 49
- **PASSENGER CAR OUTPUT (UNITS)**
  Week ended June 24 . 128,000*
  Year ago 142,247
  Details on Page 46
- **STEEL INGOT OUTPUT (TONS)**
  Week ended June 24 1,975,000*
  Week ago 1,985,000
  Details on Page 98

†Preliminary. *Estimated.

COLORKOTE®

By ENAMEL PRODUCTS & PLATING CO.



available in pre-enameled steel and aluminum coil in widths up to 60" wide

If you can Form it, Stamp it or Draw it you can MAKE IT WITH COLORKOTE... the coated metal with a million uses from . . .

TECHNICAL ASSISTANCE!
If your product is not listed here, inquire: Enamel Products & Plating Company's experienced industrial engineers and product designers are at your service to help apply **COLORKOTE** to your product.

Ash trays to skyscrapers

Base board heaters
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ft seats
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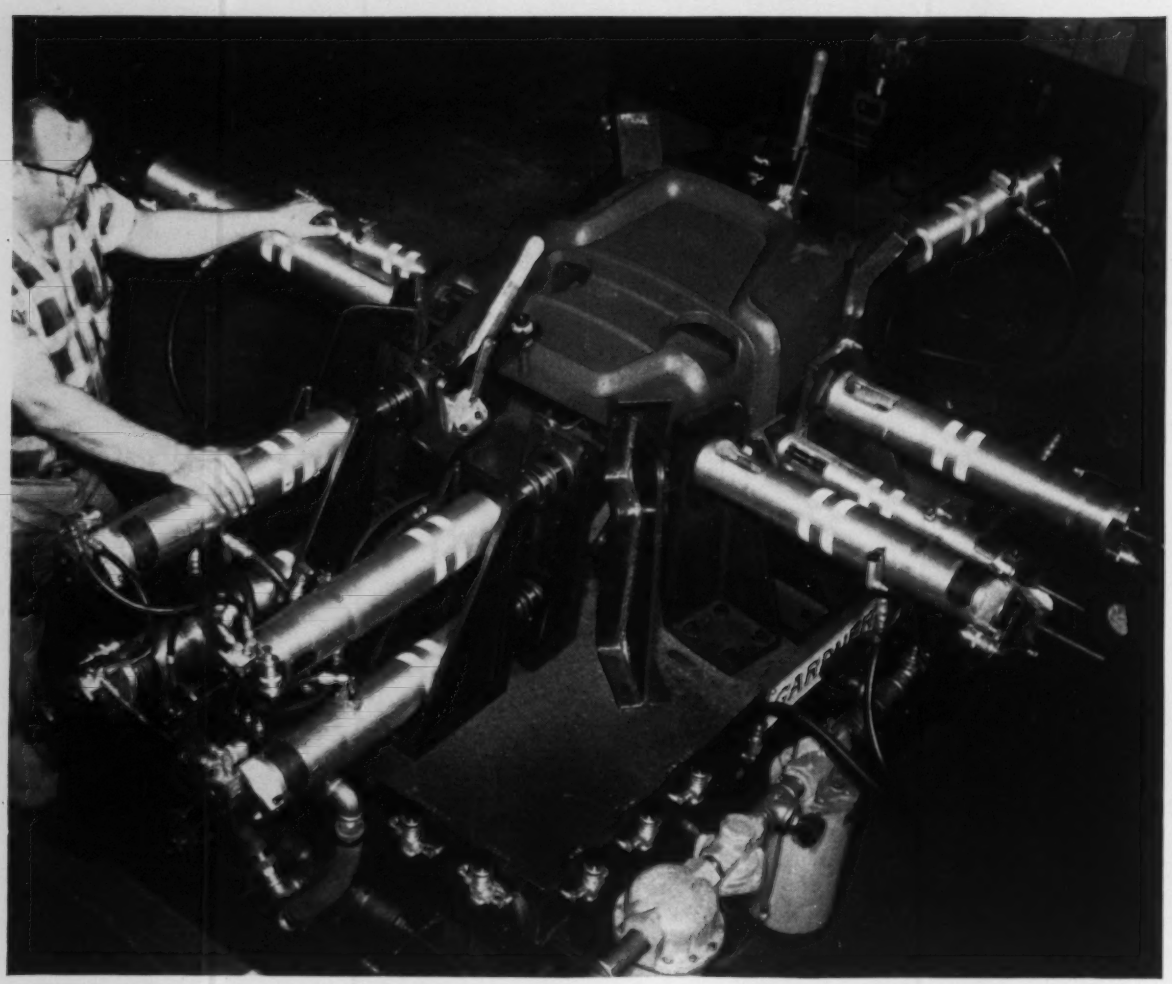


Precision becomes automatic with "Airfeedrills"

Versatile Gardner-Denver "Airfeedrill"® units are easily adaptable to almost any drilling setup. You mount them as a drilling combination of two, 20 or more spindles for automatic hole processing. Use one as a stationary drill mounted on an inexpensive fixture. As a portable drill, "Airfeedrill" hangs by its nose to a jig for precision drilling.

Find out how quickly and inexpensively you can automate your drilling operations. Contact your Gardner-Denver air tool specialist or write for Bulletins 92-1 and 92-121.

Portable Applications— "Airfeedrill" hangs by its nose to a jig for precision drilling.

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

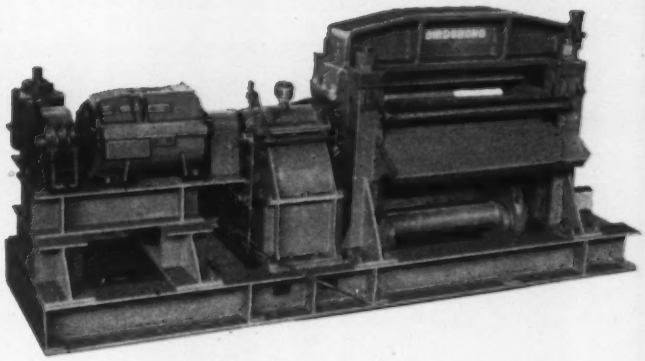
GARDNER - DENVER

Gardner-Denver Company, Quincy, Ill.—Offices in principal U.S., Canadian and Mexican cities
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario

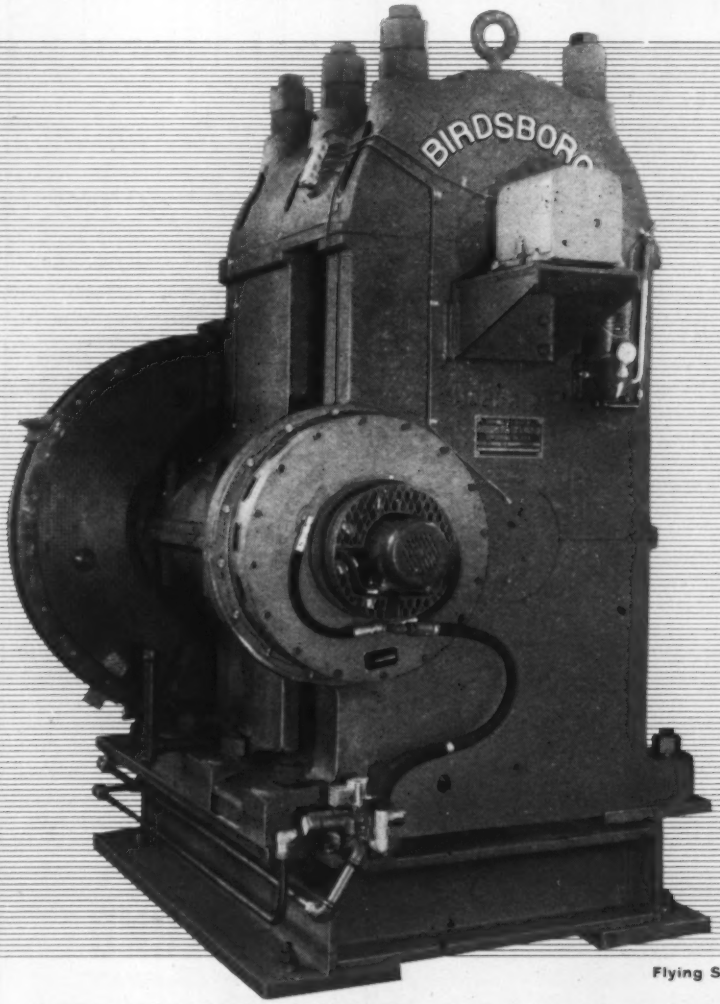
International: Gardner-Denver International Division, 233 Broadway, New York 7, N.Y.
Offices: Buenos Aires, Argentina; Artarmon, N.S.W. Australia; Brussels, Belgium; Rio de Janeiro, Brazil; Santiago, Chile; Barranquilla, Colombia; Lima, Peru; Ndola, N. Rhodesia; Salisbury, S. Rhodesia; Johannesburg, Transvaal

BIRDSBORO

Customized Shear Designs pay off in higher productivity



• Like any other key piece of mill equipment, shears have been given a lot of BIRDSBORO's attention in recent years. As a result, many innovations are available to the mill operator that can eliminate former problems and provide a finer product at a lower cost. BIRDSBORO's shear case history book is a full one. In it you can see a number of firsts, some of them applicable to your operation. The BIRDSBORO representative can help apply creative engineering to your mill. *Sales Department, Engineering Department and Mfg. Plant:* Birdsboro, Pa., *District Office:* Pittsburgh, Pa.



Flying Shear by BIRDSBORO
MM 73-59

BIRDSBORO
CORPORATION BIRDSBORO, PENNA.

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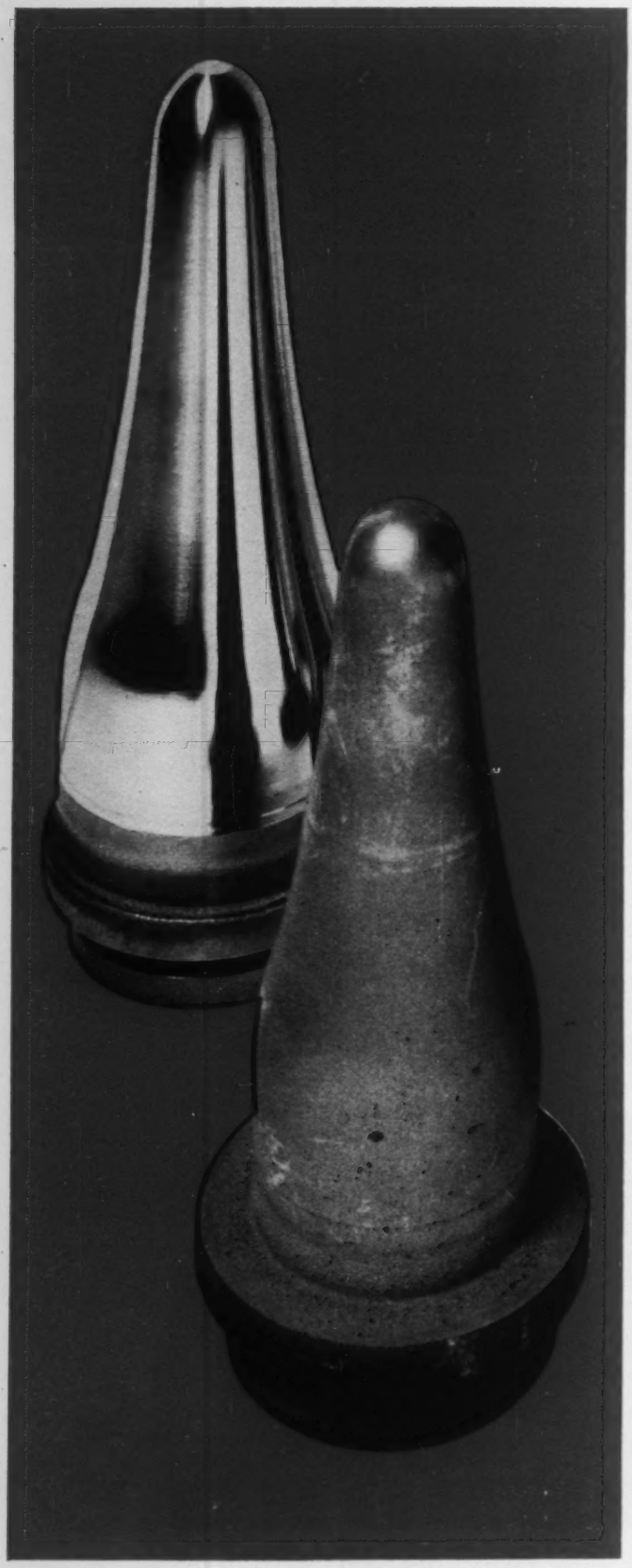
THE EDITOR VIEW
VIEWS OF EDITOR



FINISH:

Reason enough to buy LeBlond

The glass industry is beginning to turn to mold plungers hard-surfaced with Colmonoy 6 to withstand the corrosion of molten glass. At 57-59 Rockwell C hardness, you don't machine such plungers on ordinary lathes—if you can machine them at all.

Yet Overmyer Mould Company of Winchester, Ind., turns Colmonoy coated plungers in 3 passes *to a 10 micro-inch finish.* That's more than fine enough to *use as-machined.*

Overmyer does it with 15″ LeBlond Dual-Drive Lathes equipped with LeBlond tracers and constant surface speed control. From 1000 rpm at start of cut to 125 rpm at finish the Dual-Drives supply smooth, vibrationless power.

Rock-steadiness for turning rock-hard materials . . . Rigidity without excess weight or size . . . These are strong reasons to buy a lathe. They are reason enough to buy LeBlond.

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Taxmanship

A friend likens the Kennedy administration's tax reform proposals to love-making among elephants: "A lot of trumpeting is involved; everything of significance transpires at high levels; and nothing will come of it for two years."

While we, in common with many in the business community, were encouraged by the President's forthright recognition of the growing problem of obsolescence in our industrial plant and by his expressed determination to create a better climate for business growth, we are increasingly disappointed by the progress of tax reform.

The tax credit proposals, offered as an interim substitute for real depreciation reform, have been pretty well rejected by industrialists as inadequate and undesirable. At best, we fear they are diverting attention from the real and pressing need for true depreciation modernization.

A survey of nearly 1200 general managers of metalworking companies, made by this magazine (STEEL, June 19, p. 47), indicates this industry alone would spend an additional $550 million for capital equipment were the depreciation laws liberalized. More than half the responding companies said they would significantly boost their spending for equipment if depreciation policies were improved.

We can think of no action that would provide a more solid stimulus to the economy.

Proposals for taxing the earnings of U. S. companies operating overseas are equally dubious. While there can be no question that tax havens in some foreign countries and tax credits on some foreign earnings have been abused, we doubt that these are more serious than the abuses in domestic tax loopholes. We fear the proposals as they now stand would tend to make U. S. business less competitive in world trade. We might, as the Germans say, be dumping out the baby with the bath water.

U. S. business spokesmen were not impressive in their presentations on the overseas tax proposals. The best quip we heard was in the corridors. The overseas tax proposals were described as "legally unprincipled, economically unsound, and politically astute."

It could be that the administration's tax advisers are playing the angles a little too cutely, trying to please everyone a little, but failing to accomplish the objective of stimulating business, creating more jobs, and enabling this country to compete in the world market.

We hope they are not engaging in taxmanship.

Walter J. Campbell

EDITOR

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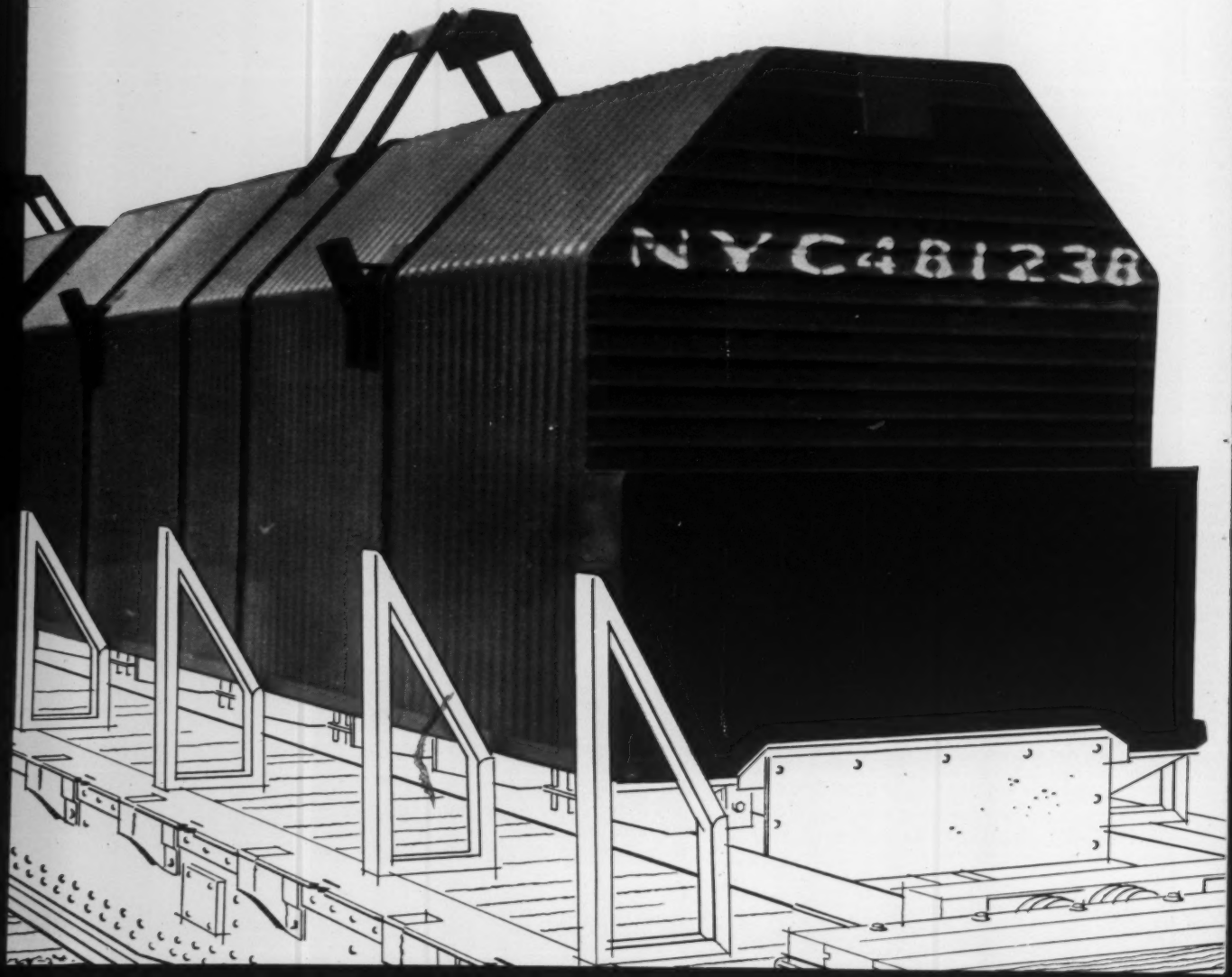

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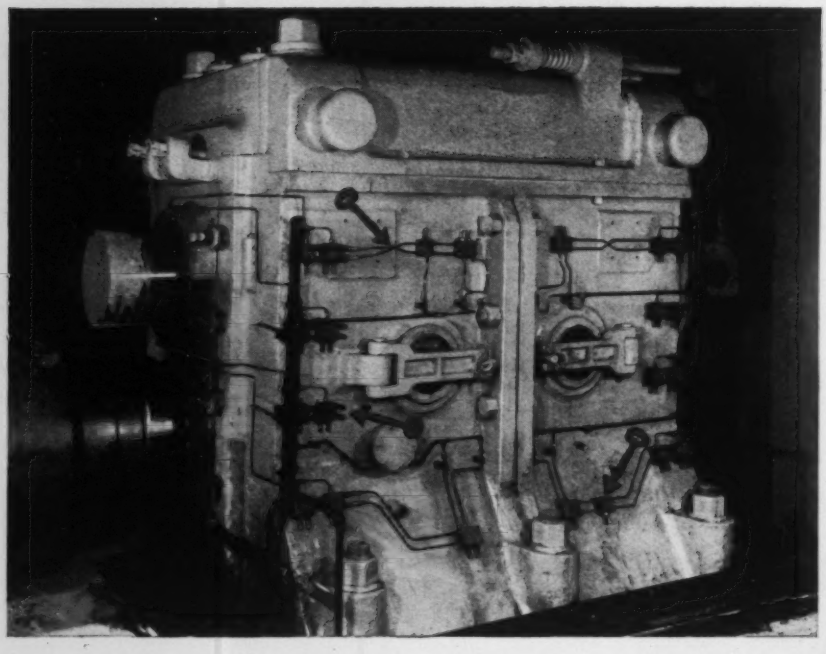

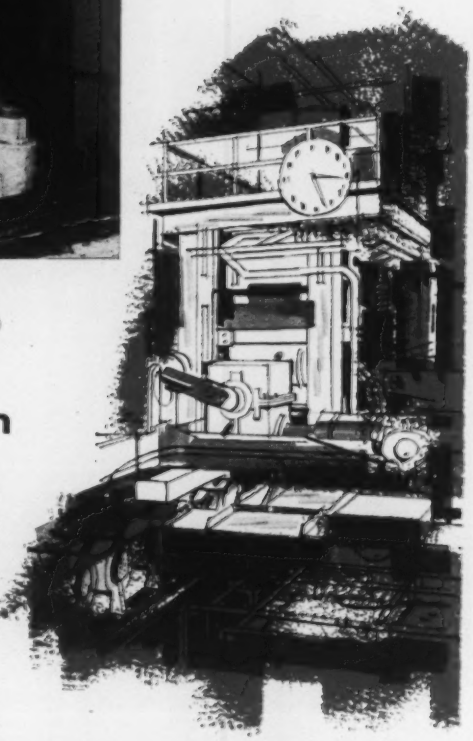

Farval lubrication helps keep Acme Steel's blooming mill on 'round-the-clock operation

Here's the delivery end of a recently installed Farval air-operated time clock-controlled spray system. It provides dependable 'round-the-clock lubrication at 18 points for the internal gearing in this new blooming mill pinion stand at Acme Steel Company, Riverdale, Illinois. An engineered overflow arrangement returns the lubricant back to an air-operated barrel pump attached to a 400-pound drum.

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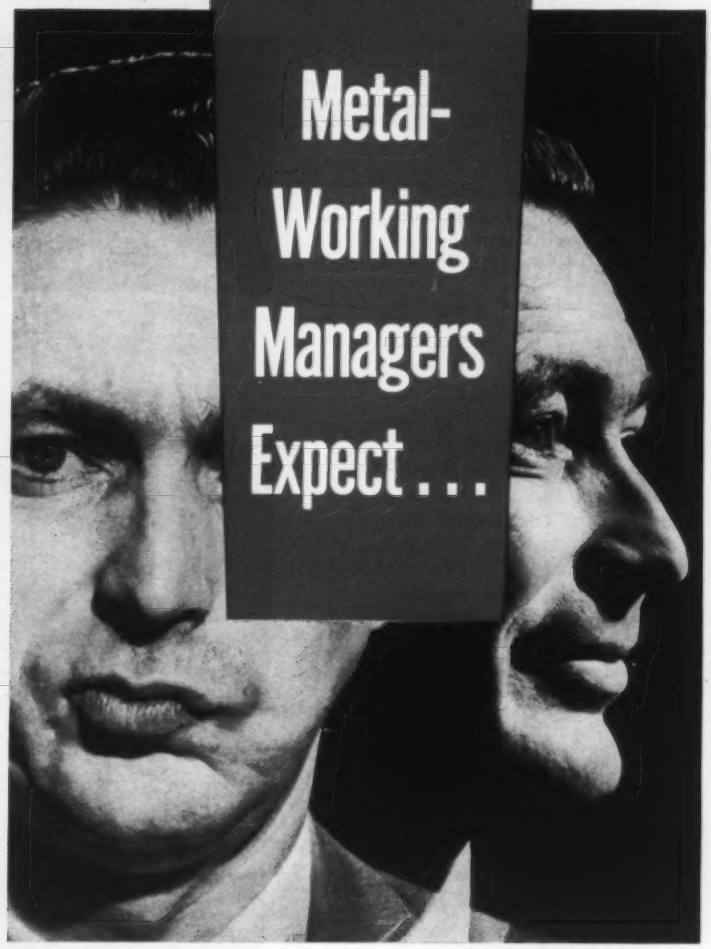


Metal-Working Managers Expect...

Sales to Climb 7% In Last Half

LAST HALF vs. FIRST HALF, 1961:	72.7% Expect Increase
	8.8% Expect Decrease
	18.4% See No Change

And Dollar Volume For Year, 1961, to Be 3% Above '60s

1961 vs. 1960:	54.2% Expect Increase
	21.1% Expect Decrease
	24.7% See No Change

THE MEN who manage metalworking companies predict a solid uptrend in second half business and a record sales year for the industry.

STEEL asked 5000 general managers of metalworking plants how they think their plants will fare during 1961's last six months. The booming response was:

- Dollar sales will be a hefty 7 per cent above those in the first half. The uptrend will bring metalworking a $150 billion year (vs. $146 billion in 1960).
- A few more dollars will find their way into the profit till. The managers predict a 4.1 per cent gain in net earnings during the second half vs. the first.

DOLLAR VOLUME INCREASES

Analysis by Industries

	Last Half, 1961, vs. First Half	Year, 1961 vs. Year, 1960
S.I.C. 33—Primary Metals	7.4%	2.7%
S.I.C. 34—Fabricated Metal Products	7.8%	2.7%
S.I.C. 35—Machinery (except electrical)	6.9%	2.7%
S.I.C. 36—Electrical Machinery	7.5%	4.5%
S.I.C. 37—Transportation Equipment	2.8%	0.3%
S.I.C. 38—Instruments, Related Items	7.8%	7.2%
Other Metalworking Industries*	9.6%	6.1%

*S.I.C. 19, 25, 39.

- Costs will continue to rise—but at a slower pace than they have in recent years.
- Prices will remain nearly stable over-all, though price warfare will continue to push some down, and the business pickup will permit scattered hikes in some lines.
- Employment will edge up, with the smallest plants showing the largest percentage gains.
- The aspirin industry will be amply aided by three problems: Foreign competition; inadequate depreciation allowances and other pressures (such as employee resist-

Metalworking Managers Expect

ance to automation) that tend to inhibit mechanization; and a crushing pressure on prices that will permit few manufacturers to pass increased costs along to the customer.

• **Small Plants Report**—The smaller plants look for the largest gains in sales and employment but the smallest improvement in profits. Plants employing less than 100 expect dollar sales to rise 7.6 per cent in the last half, while plants employing 100 to 500 look for a 7 per cent gain, and those employing more than 500 expect only a 6.2 per cent rise in volume.

But the biggest plants (500 or more employees) look for net profits to climb 5.6 per cent, while the middle group (100 to 500 employees) predicts a 4.5 per cent increase, and the small plants foresee only a 3.6 per cent improvement.

The small plants say their employment will increase 3 per cent during the next six months, while the middle group expects a 2.6 per cent gain, and the large plants predict they'll add only 1.6 per cent more employees.

• **Profits Still Lag**—Although nearly 3 out of every 4 respondents anticipate an increase in sales during the next six months, almost half the respondents foresee no improvement in net earnings. Nearly 1 in 5 looks for a profit decline (though fewer than 1 in 10 foresees a drop in sales volume).

• **Price Warfare Rages** — STEEL asked: "Is price fighting (the reduction of price without proper consideration for the effect on profits) a problem in your industry?"

A massive 85 per cent of the managers answered "yes." That group was asked how it would term the problem:

- 22 per cent said "critical."
- 32 per cent said "severe."
- 35 per cent said "difficult."
- 11 per cent said "mild."

And the managers are sharply divided on the outlook for improvement: 54 per cent look for the problem to "get worse," and 46 per cent expect the situation to "get better."

In its Apr. 17 issue, STEEL, presented a comprehensive report on the causes and cures of price fighting. (Reprints are still available at $2 each.)

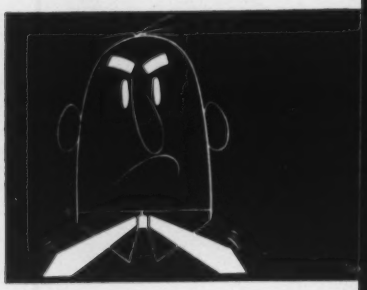
• **Exports to Rise**—Look for metalworking to better its good 1960 export showing. The consensus of the managers who answered STEEL's survey is that metalworking's exports in 1961 will be at least 2 per cent higher than the 1960 total. The managers are encouraged by the trend in some nations toward lower discriminatory barriers against U. S. goods. The biggest gains are expected by instrument makers (6.3 per cent), electrical machinery producers (4.3 per cent), and the fabricated metal products industry (3.8 per cent). Producers of transportation equipment expect a decrease of 3.3 per cent, due to the expected sizable drop in exports of commercial aircraft from last year's peak shipments.

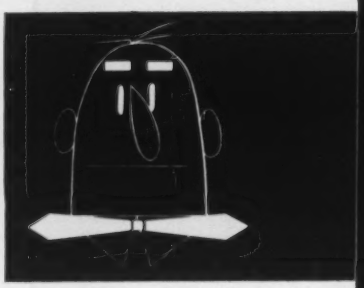
The nonelectrical machinery industry—in which 3 out of every 5 firms produce for export—looks for only a 1 per cent improvement in sales abroad. Foreign producers of standard products are beginning to garner a larger share of the world market for those items. But this industry continues to be one of the major bulwarks in U. S. international trade.

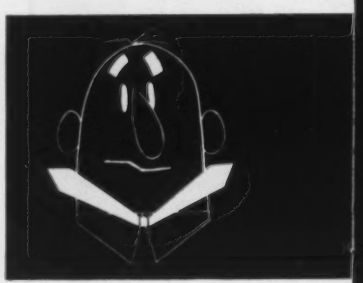
• **Foreign Competition Tough**—STEEL asked the managers: "Is foreign competition a problem for your plant?" Four in ten respondents answered "yes." STEEL asked that group to define the seriousness of the problem:

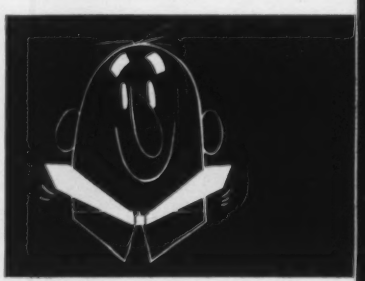
- 6 per cent said "critical."
- 16 per cent said "severe."
- 35 per cent said "difficult."
- 43 per cent said "mild."

Producers of primary metals and fabricated metal products led the parade of managers who labeled the problem "critical." But it's safe to say that no metalworking industry has been free from the on-

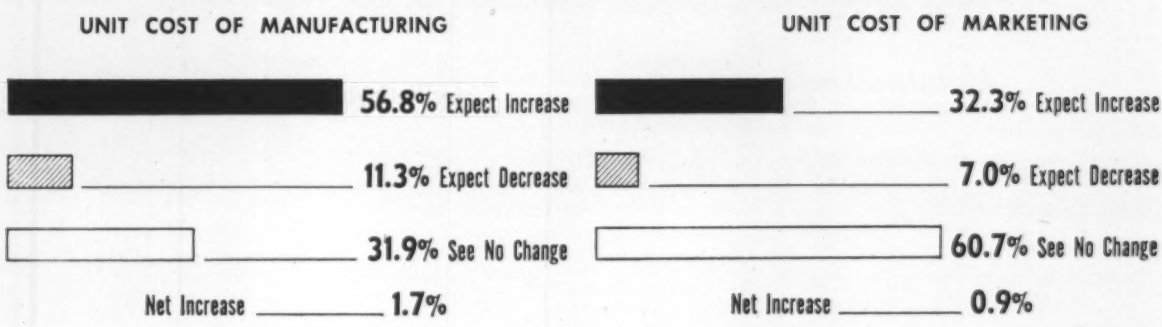




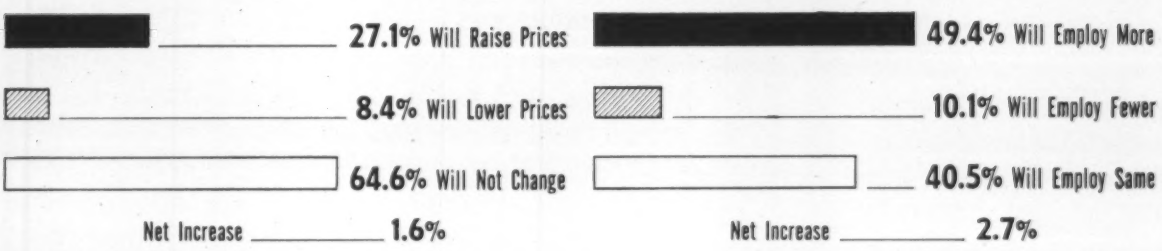




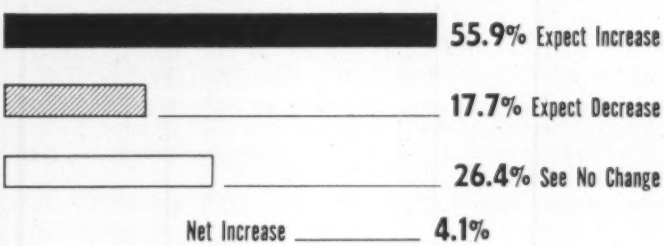
Manufacturing and Marketing Costs Will Rise



Selling Prices Will Stabilize; Employment Will Rise



Net Profits Will Advance

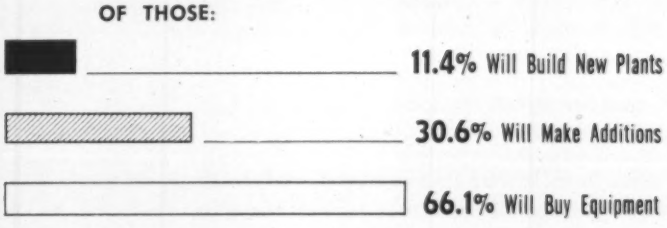


ANALYSIS BY INDUSTRIES

	Increase Expected
S.I.C. 33—Primary Metals	5.6%
S.I.C. 34—Fabricated Metal Products	4.7%
S.I.C. 35—Machinery (except electrical)	3.2%
S.I.C. 36—Electrical Machinery	4.6%
S.I.C. 37—Transportation Equipment	0.9%
S.I.C. 38—Instruments, Related Items	1.7%
Other Metalworking Industries*	5.3%

*S.I.C. 19, 25, 39.

Production Capacity Will Be Lifted 2.1%

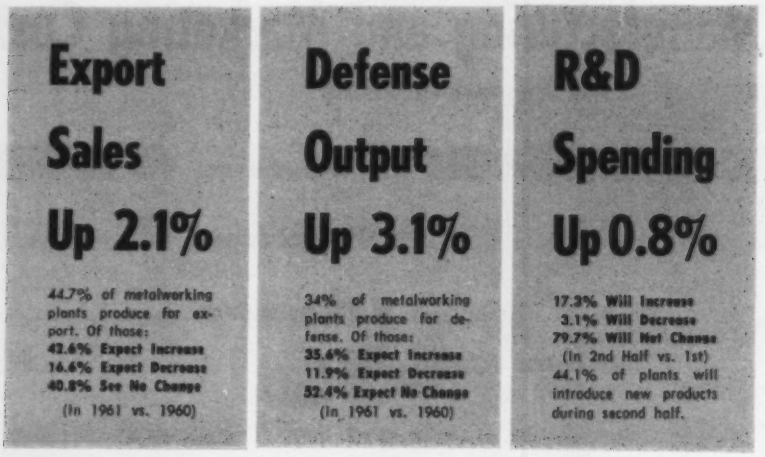


ANALYSIS BY INDUSTRIES

	Capacity Increases
S.I.C. 33—Primary Metals	2.2%
S.I.C. 34—Fabricated Metal Products	1.9%
S.I.C. 35—Machinery (except electrical)	1.4%
S.I.C. 36—Electrical Machinery	4.5%
S.I.C. 37—Transportation Equipment	1.5%
S.I.C. 38—Instruments, Related Items	1.3%
Other Metalworking Industries *	2.2%

*S.I.C. 19, 25, 39.

Metalworking Managers Expect


Export Sales Up 2.1%
44.7% of metalworking plants produce for export. Of those:
42.6% Expect Increase
16.6% Expect Decrease
40.8% See No Change
(In 1961 vs. 1960)
Defense Output Up 3.1%
34% of metalworking plants produce for defense. Of those:
35.6% Expect Increase
11.9% Expect Decrease
52.4% Expect No Change
(In 1961 vs. 1960)
R&D Spending Up 0.8%
17.3% Will Increase
3.1% Will Decrease
79.7% Will Not Change
(In 2nd Half vs. 1st)
44.1% of plants will introduce new products during second half.

slaught. However, more leading executives are grasping the concept of international operation and are aggressively seeking new foreign markets. Most believe that we'll be able to gain considerably bigger markets abroad than we will lose to foreign competitors at home.

• **Defense Outlook Up**—The managers surveyed look for an increase of about 3 per cent in defense production during calendar 1961 vs. calendar 1960. Since at least 1 in 3 metalworking plants produces for defense, that boost is significant in terms of the industry's economic health.

The transportation equipment industry—in which half the plants do defensework—is the least optimistic of the major metalworking categories. It expects only a 1.4 per cent improvement. Most optimistic are primary metal producers (who anticipate a 5.2 per cent gain) and nonelectrical machinery makers (who look for a 4.7 per cent increase).

Administrative and Congressional emphasis on the welfare of small plants has given managers in that bracket a bullish attitude toward defense business. Plants employing less than 100 expect their defense production to rise 4.2 per cent, while those employing 100 to 500 see a 2.3 per cent gain, and those employing 500 or more expect a 1.4 per cent improvement.

• **R&D Up** — Metalworking will boost its research and development spending during the second half—about 1 per cent above the outlay during the first half. Plants employing more than 500 will increase spending by 1.6 per cent (vs. 1.2 per cent for the 100-to-500-employee group and 0.4 per cent for the less-than-100 group).

ANALYSIS BY INDUSTRIES

	INCREASES EXPECTED		
	Export Sales	Defense Output	R&D Spending
S.I.C. 33—Primary Metals	1.2%	5.2%	0.9%
S.I.C. 34—Fabricated Metal Products	3.8%	2.3%	0.7%
S.I.C. 35—Machinery (except electrical)	1.0%	4.7%	0.6%
S.I.C. 36—Electrical Machinery	4.3%	2.7%	1.5%
S.I.C. 37—Transportation Equipment	(3.3%)	1.4%	(0.3%)
S.I.C. 38—Instruments, Related Products	6.3%	2.4%	3.2%
Other Metalworking Industries*	1.1%	(2.1%)	1.0%

*S.I.C. 19, 25, 39. ( ) means decrease.

• **New Product Flow**—Nearly half the nation's metalworking plants will introduce new products during the second half. Here's an industry-by-industry breakdown showing the percentage of firms in each that expect to market new items during the next six months:

Primary Metals	20%
Fabricated Metal Products	42%
Nonelectrical Machinery	46%
Electrical Machinery	60%
Transportation Equipment	32%
Instruments	67%
Other Metalworking	55%

• **Capacity Will Climb** — Metalworking will increase its production capacity by 2.1 per cent during the second half. A significant portion of that increase is the side effect of modernization. The biggest hike in capacity (4.5 per cent) will take place in the electrical machinery industry (see table above).

• **Replacement Held Back**—Antiquated federal depreciation laws continue to retard the progress of the metalworking industries. The majority of metalworking managers feel that the Treasury Department's tax incentive proposal will fall far short of providing the stimulus we need to update our industrial plant.

But, STEEL's survey shows, effective liberalization of depreciation laws would give the economy a decided lift. More than half the managers surveyed report they would increase their investment in new equipment if effective reforms were enacted (see STEEL, June 19, p. 47).

Spending for new equipment during the second half will be held at a respectable level. STEEL will present a full report on that subject next week.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.*

Plasticsmakers Step Up Competition

THE PLASTICS industry was in a cocky mood when it met in New York for the Ninth National Plastics Exposition—sponsored by the Society of Plastics Industry.

No wonder. Its sales curve is rising steadily and the production of synthetic plastics and resin materials reached 6 billion lb (value: $3 billion) last year, one-third over the 1956 figure. Sales of 6.46 billion to 6.77 billion lb (value: $4 billion) are forecast for 1961. By 1975, the industry believes output will be approaching 25 million lb.

• **A to Z**—The 200 companies that manufacture plastics and the 5700 firms that process the material are shooting for about every conceivable application, from missiles to toys. An almost all-plastic electric vacuuming and scrubbing unit made by Bissell Inc. points up the challenge to metals. "We estimate that this appliance is about 50 per cent lighter and three times less expensive than it would be if it were produced with stamped metal parts," says Peter J. King, vice president-marketing.

Production of reinforced plastics, which has doubled since 1955, is expected to double again in the next five years to 500 million lb, predicts Clare E. Bacon, Owens-Corning Fiberglas Corp. He believes the transportation industry, which used 34 million lb in 1959, will require 105 million lb by the end of 1965.

The average car uses about 25 lb of plastics vs. less than 5 lb in 1940, says J. R. Forester Jr., engineering and research staff, Ford Motor Co. His prediction: Average per car usage of 45 lb by 1965.

• **Priority Target**—Usage of plastics in home and commercial construction will increase tenfold during the '60s, claims Harry B. Warner, president, B. F. Goodrich Chemical Co. He says the market for plastic building materials will rise from today's $450 million to $4.5 billion by 1970. By the end of the decade, Mr. Warner expects plastics to account for 20 per cent of the materials being used in home construction.

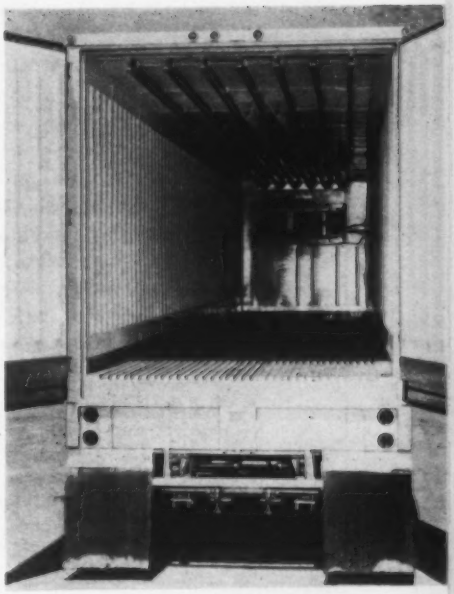
• **Defense, Tooling**—Usage is booming in defense applications. Paul S. Forsyth, Materials Div., Office of the Director of Defense Research & Engineering, Department of Defense, believes the greatest future contributions in materials for defense will probably come from plastics, particularly plastic-ceramic composites.

Plastic tooling is growing. Tools include stamping dies, hand hammer forms, jigs, fixtures, models, vacuum forming molds, and coreboxes, reports Charles V. Douglas Jr., Marblette Corp. Mr. Douglas points out that the use of plastic tooling has grown from zero to 35 per cent of all automotive tooling since 1950.

• **Shipping Containers** — Celanese Corp. of America displayed a cold storage cargo container, which, it says, "through a new self-contained liquid nitrogen freezing system can keep 10,000 lb of food under subzero refrigeration for four weeks without additional refrigerants." The 8 by 8 by 8 ft container has all four walls and floor molded into a single seamless unit, says Celanese.

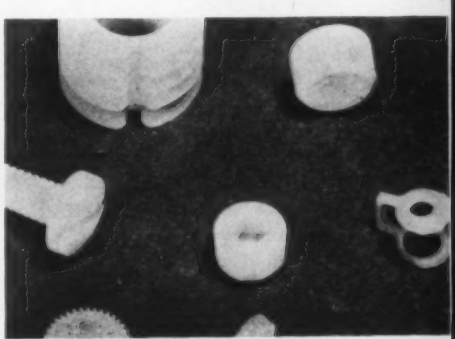
E. E. Winne, vice president of W. R. Grace & Co.'s Polymer Chemicals Div., predicts that it is possible that blow molded plastic containers can take over a substantial part of the industrial container field being served by glass carboys, steel drums, and pails. He reports that makers of all-plastic shipping containers—up to 55 gallon drum capacity—consumed close to 1 million lb of plastics last year. Forecast for 1965 by Mr. Winne: A possible 40 million lb market.

Royal McBee Corp. announced "a packaging technique for precision products." Royal office typewriters, protected by plastic bags, are placed in cardboard cartons with inner and outer shells. Liquid plastic is then poured into the cartons. It forms a foam which fills the cavities around the typewriter and quickly stiffens to produce a rigid, cushioned barrier.



Plastics gain in truck body interiors . .

. . . home accessories . . .



. . components and tooling

Help! We're Caught in the Middle

"PURCHASING and production groups in the automotive companies should become better acquainted with the bargaining problems of their suppliers."

That's the plea of Kenneth E. Porter, research director, Employers Association of Detroit. His association represents about 180 companies in the Detroit area, most of them suppliers to the automakers.

"Too many suppliers tell me they are squeezed more by the auto companies than by the union. They say they could win less costly settlements if they could stand up to the union's strike threats. But every time they try, the auto companies—fearing a production tieup—threaten to cancel contracts or pull dies out of these shops. Once the job is pulled, it seldom is returned to that shop.

"In the long run, this kind of thinking only adds to the auto company's costs because suppliers have little choice but to meet pattern settlements, which are usually too costly for them. Sooner or later, these extra costs are passed on to the automakers in one form or another.

"Venders don't want a guarantee. They recognize that auto production must be maintained. But they could fight harder for better contracts if they knew they stood a good chance of getting these jobs back after a strike is over."

KENNETH E. PORTER

Auto Suppliers Will Buck Wage Hikes

"THERE WILL BE more nonpattern labor contract settlements by makers of auto parts this year than in the last three years put together," predicts Kenneth E. Porter, research director, Employers Association of Detroit (EAD).

A handful of the auto suppliers will try for wage cuts, but most will fight hard to hold wages where they are, a STEEL survey shows. Many are reconciled to the idea of putting 3 to 6 cents into fringe benefits if the Big Three automakers do. Suppliers will exert considerable pressure for shorter contracts—12 to 18 months.

The Big Three contract talks which open Wednesday at General Motors Corp. will affect about 1100 metalworking firms that have contracts with the United Auto Workers. Union officials say about 90,000 production and maintenance workers are employed in some 350 plants whose biggest customers are the automakers. Another 85,000 nonunion employees work for other auto partmakers.

• **Profits Drop**—The biggest factor behind the move for nonpattern settlements is the profit squeeze auto part suppliers have felt the last two years.

In trying to hold the line on car prices, autobuilders have been reluctant to let venders pass on higher costs caused by wage hikes. Mr. Porter says net profits after taxes have dwindled to 1½ to 3 per cent for most of 180 member firms in the EAD. "That's not enough to provide for badly needed capital investment and give a wage increase too," he asserts. About 60 per cent of the EAD member firms have UAW contracts.

• **UAW Knows It** — While the union doesn't admit it officially, company negotiators agree that there's less militancy among rank and filers and more recognition that companies must be given wage and fringe concessions if they're to maintain jobs. Reports Ray Vacha, industrial relations director, Associated Industries of Cleveland: "In view of economic considerations, the union is showing more consideration for smaller companies. National and local union officials

are concerned with the impact of foreign cars on the domestic market because they've gobbled up U. S. workers' jobs."

The lack of grievances is a tip-off to the labor climate. Malcolm Daisley, industrial relations manager, Eaton Mfg. Co., Cleveland, says that his company always has had a pickup in grievances before tough negotiations—something that hasn't happened so far this year. Eaton's master UAW contract, covering 2500 workers, expires Oct. 29. Another Cleveland firm, Midland-Ross Corp., says its Grand Rapids, Mich., plant hasn't had a written grievance all year.

Concludes Mr. Porter: "In many of these firms that are hardest hit, management has cut salaries and overhead about as far as it can, and the union knows it. There are a number of plants among our membership that won't even have to convince the union they're in trouble—they already agree with them!"

Young Spring & Wire Corp., Beverly Hills, Calif., has five plants with UAW contracts expiring in 1962.

It says it can't afford a pay increase and feels it's in for tough bargaining next year. In a recent non-UAW pact at its Ottawa, Kans., plant, Young settled for a 15 cent package to be spread over three years. The company says it's satisfied with the agreement because it's in line with productivity increases.

• **Better Prepared**—Suppliers seem to be better prepared than they have been in previous years. They've collected figures showing how fringes and operational practices have influenced costs. The Detroit plant of Wolverine Tube Div., Calumet & Hecla Inc., recently drew up charts to show its salaried people how much income was needed to make a profit and pointed out that the money could be spent either for wage increases and dividends, or for capital reinvestment. It then asked the salaried workers what they'd do. Most favored holding the line on wages. Bob McCoy, plant industrial relations director, says he plans to do the same thing with the union before contract talks open officially. He also says the plant will strive for a shorter contract instead of its traditional three year pact.

Mather Spring Co., Toledo, Ohio, has a contract with 500 UAW workers, which expires in February. It is a pattern agreement except for cost of living. William V. Luneberg, executive vice president, feels that operating clauses governing work practices need the most attention.

In Cleveland, Midland-Ross Corp. reports its contracts expire Sept. 1. They cover 2000 employes, about 25 per cent of the firm's hourly workers. T. G. Brichze, labor relations manager, says operation clauses need revising. He isn't sure the firm will follow the Big Three wage pattern, although it has in the past. The company has been trending toward insurance company coverage plans since the last Blue Cross rate increase.

The Detroit Tooling Association (DTA) is another group to watch this year. It has 100 member shops and 7500 skilled workers covered by a master UAW contract that expires Oct. 1. What's significant about the DTA is that two and a half years ago its contract covered 132 union shops and 10,000 workers. The profit squeeze has knocked off 32 tool and die companies and eliminated 2500 jobs.

Association members say they can't afford to follow the pattern this year, and there's a strong hint that the group might seek to reopen its contract early in an effort to negotiate some reductions, or to extend its contract before Big Three pacts are signed. The DTA contract already differs from the pattern in that it has a funded severance pay plan instead of supplemental unemployment benefits (SUB). It has no maximum rates and no paid union representatives. Insurance is only partially paid; there's no formal annual improvement factor; and the group pays for six holidays instead of seven, as the auto companies do.

• **Who Follows Pattern**—Suppliers seldom follow the Big Three pattern of fringes and practices, but most of them tend to adopt the direct wage provisions, says Prof. Harold M. Levinson, University of Michigan economist. In one check between 1946 and 1957, Professor Levinson found only 26 per cent of the companies he surveyed adopted industry pattern settlements. When they have, adjustments have almost always been made during the contract life. That is particularly true of firms with less than 500 employees.

Says Professor Levinson: "The only point at which the union has given serious consideration to a below-pattern settlement arises when . . . the union feels a cost increase might force a firm out of business." Mr. Porter explains that that's a considerably softer attitude than the UAW had ten years ago.

Auto part suppliers are voicing understandable concern over the upcoming Big Three talks. Here's a rundown on how they feel about key issues coming up.

Direct Wages

1. **Wage Increases**—Most want to hold the line.

2. **Cost of Living**—Half of them don't have it now. The rest want to eliminate it, or at least limit COL revisions to once a year.

3. **Annual Improvement**—There's some pressure building to replace the clause with a "more realistic interim adjustment as warranted."

Fringe Benefits

4. **Insurance** — Most favor slight increases in coverage if costs are split between company and worker. There's growing dissatisfaction with some Blue Cross and Blue Shield programs. Look for some switching to insurance programs.

5. **Pensions** — There'll be more benefits here. Suppliers seem willing to reduce retirement age requirements from 65 to 60.

6. **SUB**—Not all suppliers have the provision. Those who do won't buy any changes unless the union can prove the companies will have time to build funds.

Practices

7. **Seniority**—Strong attempts will be made to cut confusion and costs involved in shift, departmental, and job classification provisions.

8. **Union Committeemen** — Most firms complain of too much company time spent by union reps on union activities.

McNamara Huddles with Advisers on Incentives for Defense Contractors . . . Housing Bill Wins with Flying Colors

These Factors Would Govern Fees for Defensework:

- Over-all performance of the contract.
- Quality and reliability of product.
- Changes in contractural terms required.
- Assumption of financial risk by contractor.
- Technical breakthroughs achieved.
- Government financial assistance required.

NEW WAYS TO ENCOURAGE defense contractors to do a better job are being discussed at the Pentagon. Defense Secretary Robert S. McNamara is spending a lot of time with his advisers.

A new formula designed to give Defense more performance for the money it spends has been proposed. It allows the department to force contractors to take a significant loss when they fail to come up to contract standards.

It is described as a trial balloon by Assistant Defense Secretary Thomas Morris. A range of fees—from minus 5 per cent to plus 15 per cent of the target cost—would be set up. The final fee would be decided by a board of review, based on the factors shown in the checklist above.

Two groups are working with the Defense Department in the hope that a new incentive approach will satisfy Congressional fears of excess profits. (They are the Aerospace Industries Association [AIA] and National Security Industrial Association [NSIA].)

Mr. Morris says Defense would have to work out "an understanding" with the Renegotiation Board (which has the power to take "excess" profits away from a firm on a company-wide basis, not on a contract-by-contract basis). It is the fond hope of one group in Washington that the use of the "cost-plus-award-fee" technique would exempt contractors from renegotiation.

Some contractors are already speaking out:

Robert E. Lewis, president, Perkin-Elmer Corp., thinks the tendency to establish arbitrary levels of profits in the defense industry (say 7 per cent on a cost-plus-fixed-fee or 10 per cent on a fixed price basis) indicates a failure to recognize the tremendous technical problems of the new military age. P. E. Haggerty, president, Texas Instruments Inc., charges that under today's contracting system companies tend to make more profits on mediocre products than they do on good ones. Profits should not be based on costs but on results, he says. He abhors the tendencies of the federal government to look only at costs when it is judging profits.

● McNAMARA LOOKS AHEAD—The defense secretary is ranging over the whole field of procurement. He promises industry that he is checking seven areas for more businesslike management practices:

1. Simpler specifications and more reasonable performance standards, taking into consideration the costs involved.
2. Shorter development times (speeding up the decision making process to avoid endless exploration of technical alternatives).
3. More reliable cost estimates. (Without them, arbitrary budget ceilings have to be imposed.)
4. Fewer engineering changes after production has begun.
5. Simplified procurement procedures, including those used by primes with subcontractors.
6. Streamlined reporting on contracts. (Defense should stop asking contractors for useless information.)
7. Elimination of uneconomic practices, such as local community pressures for defense business as a hedge against recession.

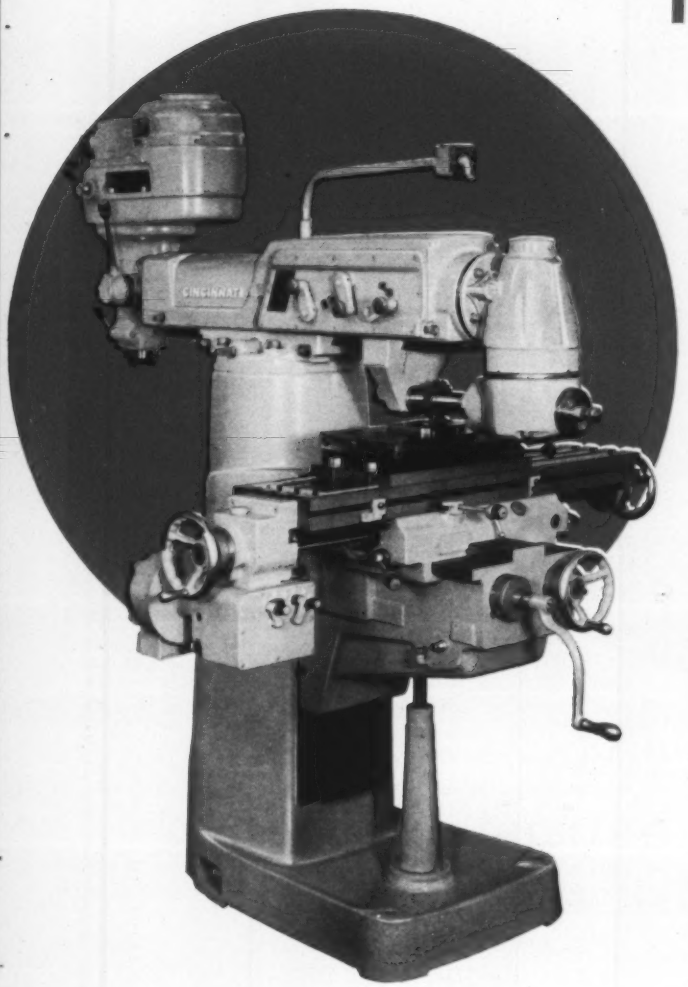
● HOUSING BILL MEANS JOBS—The $6 billion housing bill sponsored by the President passed the Senate with flying colors. The bill makes about 9 million more U. S. families eligible for Federal Housing Administration (FHA) insured loans. Included is $50 million to be used by local agencies for mass urban transportation projects.

Unemployment and depressed business conditions had much to do with Senate passage. Unofficial estimates of the impact on the home building market: Up to 3.9 million families might be interested in buying a home as a result of the lower down payment and long mortgages (40 years) sponsored by the bill. The International Association of Machinists (IAM) estimates 130,000 jobs a year are created by the demand for 100,000 houses, including construction, plumbing fixtures, appliances, and materials.

CINCINNATI MILLING MACHINE DIVISION

Announces New

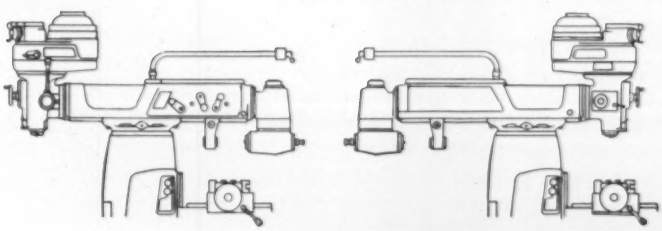
H-V TOOLMASTER
MILLING MACHINE



How's this for a new idea in light-duty toolroom milling . . . a turret type machine for both horizontal and vertical operations! The new CINCINNATI H-V Toolmaster gives you this unique degree of versatility. In the illustration, the H-V is performing a horizontal milling operation with the double swivel spindle head. The arbor and arbor support can be removed, and the same spindle head is ready for vertical or angular milling operations. Or to save setup time, the machine may be equipped with any one of three vertical spindle heads on the opposite end of the overarm. Then the double swivel head becomes a permanent horizontal setup, with 2 hp drive. Merely swiveling the overarm turret 180° locates the vertical spindle over the table for vertical and angular milling, drilling and boring.

H-V Toolmaster versatility is unmatched by any other machine in its class. Vital statistics for the spindle head include: 2 hp gear drive . . . eight spindle speeds, 75 to 1130 rpm or 50 to 750 rpm . . . No. 40 standard spindle nose . . . arbor support for arbors up to 1¼" diameter.

More information on the H-V and on the entire line of Toolmasters will be found in publications M-2229 and M-2110. Write or telephone today for your copies. **Milling Machine Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio,** *REdwood 1-2121.*



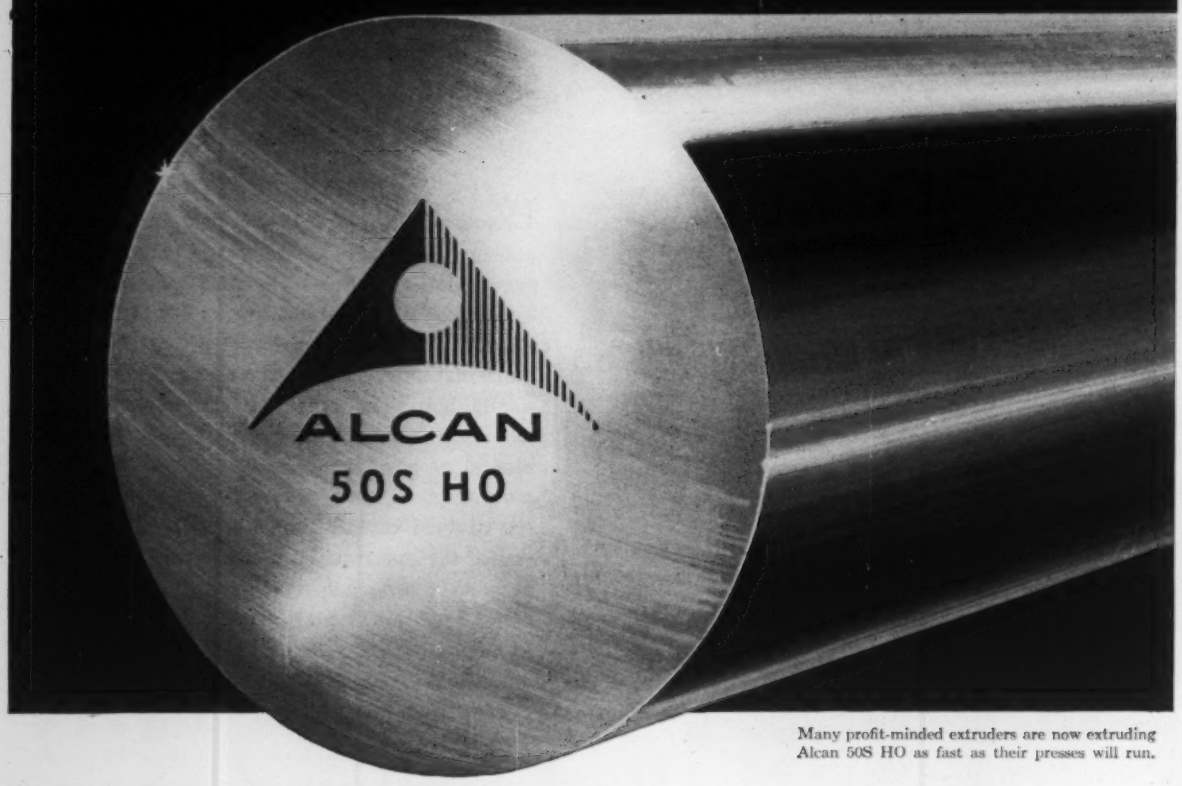
Horizontal or vertical milling head is available within a minute or two, by merely swiveling the overarm turret of this H-V Toolmaster Milling Machine equipped with a No. 1D Vertical Head. Drawings at right illustrate its unique range of versatility.

KNEE TYPE AND BED TYPE MILLING MACHINES • DIE SINKING MACHINES • CUTTER AND TOOL GRINDERS • VERTICAL BROACHING MACHINES • ELECTRICAL MACHINING EQUIPMENT

CINCINNATI®

MILLING MACHINE DIVISION

Much greater speed · Good finish · Good strength



Many profit-minded extruders are now extruding Alcan 50S HO as fast as their presses will run.

Here in one aluminum ingot...

much greater extrusion speed... plus good finish and strength

WHEN you run Alcan 50S HO you get greater production . . . per day and per machine-hour . . . while still maintaining good mechanical properties and finish.

That sums up the experience of many fabricators now using this much-improved version of the long-time favorite Alcan 50S. They're unanimously enthused about its increased press speed . . . *up to maximum press capacity.*

Because of the all-around performance of Alcan 50S HO, there is no longer any necessity for stocking a large variety of ingot products. This one ingot takes care of the majority of product runs. Alcan 50S HO Ingot can reduce your inventory as much as 60%.

Alcan of course supplies other types of extrusion ingot to meet special job requirements.

Run 50S HO on your own equipment . . . and clock your production on the run-out table.

For further information on Alcan 50S HO, write or phone your nearest Aluminium Limited Sales Office.

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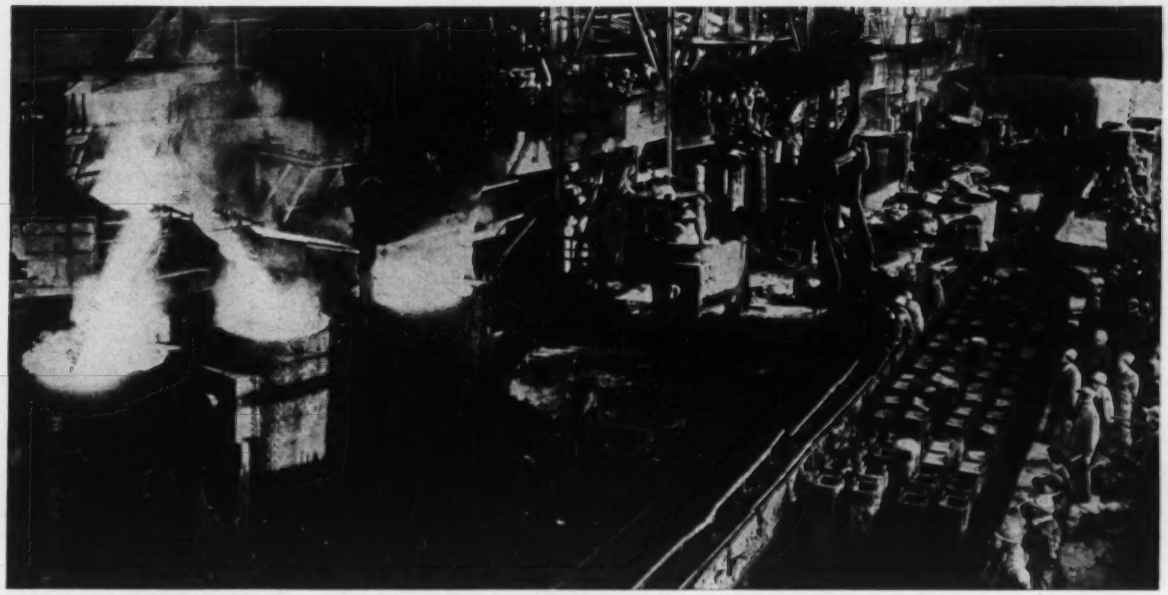


Three tapping troughs to lead molten steel into casting ladles have been used at a number of Red China's larger steelmaking facilities

Briton Urges West Trade with China

THE FREE WORLD would benefit if the West recognized Red China and traded with her, in the opinion of H. W. A. Waring, deputy chairman and general managing director of England's GNK Co. Ltd.

In a report to the British Iron & Steel Federation, he said about 75 per cent of Red China's foreign trade is with Russia. The more trade and cultural ties we can make with the Communists in China, the less likely they will be to cast stones at the West, reasoned Mr. Waring. He also pointed out that the mainland of China is a vast potential market: 670 million people in a 5.9 million square mile area.

• **Dealing With Chinese**—Mr. Waring, who recently returned from a trading mission to China, said the paucity of sterling and a short term buying policy are the most difficult aspects of trading there. Red China seeks to buy vital requirements for near term needs only.

Communist invitations are not easy to come by and, even with a visa, a trip not properly sponsored is likely to prove a waste of time, reported Mr. Waring.

He regards the Chinese as keen and honest traders. However, "face" is important and thoughtless actions by governments or individuals may do lasting harm, he warned.

All business is carried out by the various export-import corporations based on the requirements of the National Plan. The system is cumbersome and it is difficult to come in contact with the end user.

• **The Steel Industry**—Red China's steel production is running at an annual rate of about 20.2 million ingot tons, said Mr. Waring. It is increasing at a rate of 4.5 million to 5.5 million tons a year and may top the British figure of 28 million tons by 1962.

The United Nations estimates China's 1972 production at 58.2 million tons. That would be the highest increase in the world. Nevertheless, the Reds predict an even higher annual output by that year—78.4 million tons.

Most of the backyard blast furnaces which sprang up three years ago are out of operation. More sophisticated facilities, producing 300 to 750 tons a week are now used. Such installations often combine a side blown converter and a foundry cupola.

Mr. Waring visited two large steel plants under construction. Both plants will use large open hearths with 560 ton blast furnaces. The Chinese didn't seem to know much about the oxygen process, noted Mr. Waring.

The Reds are developing an extensive railway system. However, there is an acute shortage of heavy and light rails.

Foundry pioneers marketing concept . . .

Bond Protects Castings Buyers

"IF AND WHEN you run up machining expense on a flawed casting, we—not you—will pay the bill up to a maximum of the selling price of the casting."

That offer was made last fall by Douglas E. Scott, sales manager of aluminum castings, Morris Bean & Co., Yellow Springs, Ohio.

Morris Bean, president of the 15-year-old independent foundry, amplifies the point: "It has always been customary in our industry for the foundry's liability to stop with the value of the casting. The customer could accept or reject the casting on the basis of his inspection procedures. If he accepted it and did subsequent machine work on it which exposed foundry defects (which scrapped the part), he accepted the loss of the machining expense. Our Machining Bond on Castings guarantees we will not only replace the part but will pay the incurred machining cost . . ."

Husband and wife team, Morris Bean, president, and Xarifa Bean, research director (one of the few women holding that title in the foundry industry), stress quality, emphasize R&D, and back their beliefs with a machining bond on castings

• **Birth of a Concept**—In 1958, Mr. Scott was attempting to land a contract for producing 150 lb, high speed, aluminum impellers. The potential customer had been experiencing a 40 per cent reject rate on castings supplied by a small Midwest foundry. The company's chief engineer and purchasing agent believed the end product would cost less if higher quality and better tolerances could be obtained with fewer rejections and lower scrap losses.

Mr. Scott clinched the contract by offering to pay machining costs on defective castings. One and a half years later, after the customer had bought $80,000 worth of the impellers—the total refund under the machining bond was $128. The purchaser had lowered end product costs by 20 per cent, yet the caster's selling price per piece was $100 more than the one quoted by the former supplier.

• **Expanded Offer**—After that trial, the company opened the offer to all its 150 customers on all products. Letters of announcement were sent to buyers before advertisements were run in trade and business media.

Reaction within the foundry industry was immediate. One man, for example, declared the guarantee was idiotic. Later, he became complimentary, says Mr. Scott. "In reality," he comments, "it's like being against virtue.

"In the past, many of our customers asked: 'What percentage of our machine time will be wasted on scrap castings?' We replied that such time would be minimal or nonexistent," says Mr. Scott. "Now that we've backed up that implied warranty with our machining bond, we have better acceptance at the purchasing level and strong appeals in the research and engineering areas."

• **Customer Service**—One Morris Bean customer acquired a $14 credit for machining costs but neglected to claim it. A company representative visited the customer and requested a bill. The customer answered: "It was only $14, and a claim would have cost us $10 to process." The credit was paid.

In another case, a company was overlooking surface flaws that could have been detected before a great amount of machining was undertaken. The foundry refunded the customer's losses and requested that the inspection stage be moved up to catch the easily seen defects.

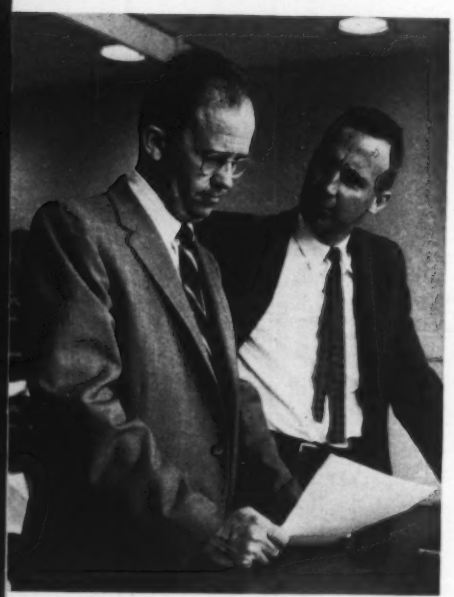
Mr. Scott has also found that there's a side benefit to the bonding. Under the previous practice ("touch a tool to it and it's yours"), customers would hastily return questionable castings. "Now," observes Mr. Scott, "many com-

panies will cut a casting to see if a surface imperfection will clean up . . . and they often succeed . . . saving substitution costs."

• **Company Growth**—Despite the high mortality rate and especially sharp price competition in the foundry industry, this commercial jobbing firm has grown from a $1.4 million sales base in 1952 to a healthy $5 million in fiscal 1961.

"In addition to solid use of know-how obtained through extensive research and development on methods to make intricate aluminum and ductile iron castings, our 450 employees are imbued with the idea that quality pays," comments Russell Hollister, vice president, sales and quality control. "The bonding is a plus value: It's an additional stimulus to our production and inspection people to prevent shipping inferior castings."

• **Pioneering Effort** — Mr. Bean rounds out the concept: "So far as we know, we have pioneered the machining bond approach in the foundry industry. In a competitive market, quality is something that constantly has to be sold to price conscious buyers. Often, it is difficult to define and distinguish quality to a point where it has significant meaning, especially when the customer is a large corporation with complex and arbitrary procurement procedures. Our machining bond has been extremely useful in building a value concept in the minds of our customers. It clearly and sharply distinguishes quality, and identifies it with our product and the name of our company."



Checking specifications in Morris Bean & Co.'s laboratory are Russell Hollister (left), vice president, sales and quality control, and Douglas E. Scott, sales manager of aluminum castings. Mr. Scott is the originator of the machining bond concept

Signs of Machine Tool Upturn Still Elusive

MACHINE TOOL orders were a little better in May than they were in April—about $50.3 million vs. $47.9 million in April, including both cutting and forming types.

The industry's backlog slipped during May from 4.7 to 4.2 months.

Despite some reports of an upturn in machine tool business, and despite optimism (sprinkled liberally with hope), the 1961 upturn in machine tool business hasn't arrived —and it may be some months away.

• **What's Coming?**—A STEEL survey of plans for capital equipment spending in the second half (to be published in next week's issue) shows users intend to spend about 4 per cent more for metal cutting machine tools in the last six months than they did in the first six. That would bring the year's total to an estimated $530 million—some 5 per cent better than the poor showing in 1960.

Depreciation reform could stimulate buying above that level (STEEL, June 19, p. 47). So could some major automotive buying, but STEEL's survey turned up no evidence of major programs in that industry.

• **Foreign Aid** — Business from overseas has been a big assist to the industry in the first five months. Nearly 30 per cent of the orders from metal cutting machines came from abroad during that period. More than 20 per cent of the press business came from foreign buyers.

Foreign business is generally recognized as temporary. Machine tool builders abroad have extended backlogs (some as high as two years), so they can't meet immediate customer needs. The hope is that domestic orders will turn up substantially before the export business begins to wane.

MAPI Report Says Foreign Branches Aid Our Economy

PRIVATE investment in manufacturing facilities abroad benefits the U. S. economy and contributes substantially to domestic employment, concludes a report filed by the Machinery & Allied Products Institute, Washington, with the House Ways & Means Committee.

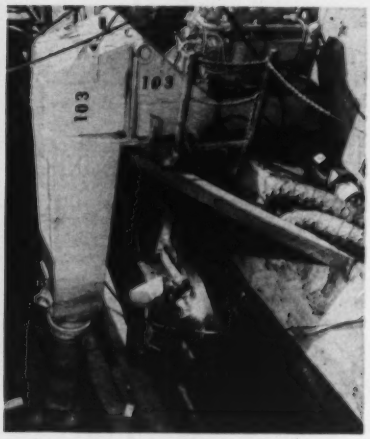
The report shows that foreign subsidiaries and branch plants of capital goods manufacturers have opened and expanded export markets for products manufactured in the U. S., thus increasing job opportunities for Americans and tax revenues for the U. S. government. One company claims that 11 per cent of its domestic employees owe their jobs to the firm's foreign operations.

U. S. companies that saw their exports drop in the late fifties because of import restrictions imposed by foreign countries found that exports rose sharply when foreign subsidiaries and branch plants were subsequently established, says MAPI.

The report also shows that firms invest foreign earned income in areas which the U. S. seeks to aid. Higher taxation on foreign income would largely dry up this source of private investment which the administrations since World War II have encouraged, predicts MAPI.

This huge shoe below the hull of the CUSS 1 must guide thousands of feet of drill pipe to the ocean floor. Global Marine Exploration Co., Los Angeles, is doing the work

The helmsman uses a joystick to maneuver the ship like an airplane. The console was invented for the project to keep station over an exact point



Drilling from the heaving surface of the ocean is no easy job. This is one of the four Murray & Tregurtha, 200 hp, outboard diesel engines which control and power the experimental drilling ship

Tests Widen Oil Drilling Potential

TEST drilling near Guadalupe Island, off the coast of Lower California, has proved that oil exploration can be extended to seven-eighths of the earth's surface, say scientists working on Project Mohole.

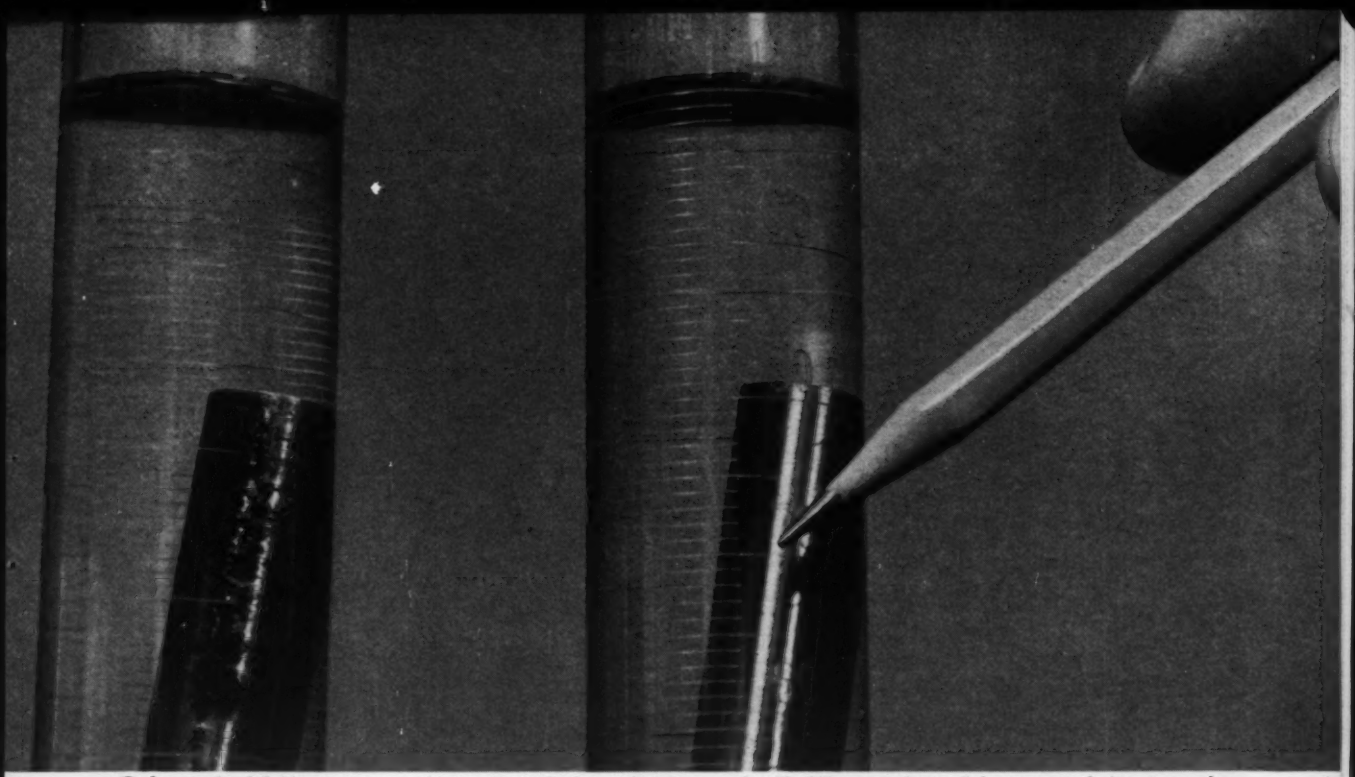
To metalworking, that means eventual widening of the market for drilling equipment, drill pipe, ships, and platforms.

In coring tests off Guadalupe, five holes were drilled in 11,700 ft of water, the deepest going 601 ft. The drill ship *CUSS* 1 was held in position by four 200 hp engines. Formerly, ships used in deep water drilling had to be moored.

• **Steel and Aluminum?**—Drill pipe included 1500 ft of steel with a tensile strength of 115,000 psi, 5000 ft of Grade E (75,000 psi), and 6500 ft of Grade E with a slightly lower tensile. Drill collars and guides kept pipe from snapping.

When the full scale Mohole gets underway (it may take two years to pick a site and develop special equipment), alternate sections of steel and aluminum drill pipe may be employed to cut down the weight of the string. Total depth is expected to be in the range of 27,000 to 30,000 ft, with 12,000 to 15,000 ft of water under the drill ship.

• **Name?** — The project gets its name from its objective: Drill through the Mohorovicic discontinuity, the boundary between the crust of the earth and its mantle.



Carbon steel rod (left) rusts in water after two hours. Rod on right is immersed in Shell Dromus solution. It has not rusted after six months.

REPORT:

Shell reports on ten features of Dromus Oils that can help you reduce cutting time and costs

THE Shell family of Dromus® Oils includes both solution-type and emulsifiable cutting fluids.

Each Dromus product has its own area of application—depending on water hardness, metal characteristics and specific job requirements. However, the entire range of Dromus Oils offers these ten benefits:

1. Dromus Oils are concentrates. They are designed to be mixed with the proper quantity of water at point of use for optimum results.

2. Dromus Oil emulsions resist foaming even under most severe conditions.

3. Dromus Oils contain an effective germicide. Result: less danger of rancidity and bacterial growth.

4. Dromus Oils do not separate. Even when mixed into emulsions containing more than 50 parts' water, Dromus Oils maintain their stability.

5. Dromus Oils prolong grinding wheel life. They prevent the wheel from "loading up" with metal from the work.

6. Dromus Oils provide effective corrosion protection for tool and workpiece. (See photograph above)

7. Dromus Oils permit greater dilution than many soluble oils.

8. Dromus Oils wash away metal chips with high efficiency. Chips then settle out of the emulsion.

9. Dromus Oils can be kept in the machine during plant shutdowns.

10. Dromus Oils are made under strict controls. Manufacture of Shell Dromus Oils is scientifically controlled.

There is a Dromus Oil for your cutting, sawing, boring, threading, milling or grinding need. Call your Shell Industrial Products Representative. Or write: Shell Oil Company, 50 West 50th Street, New York 20, New York.

SHELL

A BULLETIN FROM SHELL
—where 1,997 scientists are working to provide better products for industry.

CHAMBERSBURG

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AUTOMATIC FORGING IN JOBBING LOT QUANTITIES

Made possible by the MODEL "C" IMPACTER with a unique program-controlled Feed Device

A "BREAKTHROUGH" IN THE MECHANIZATION OF THE DROP FORGING PROCESS

Write for new bulletin No. 110-L-1 "Chambersburg Cecomatic Process for the Jobbing-Type Production of Drop Forgings"

CHAMBERSBURG ENGINEERING COMPANY • CHAMBERSBURG, PA.

How Truck Output Is Split

(Percentage of market)

	1961*	1960	1959
Chevrolet	30.3	32.8	28.6
Ford	30.1	28.3	30.5
International	13.1	10.0	12.5
Willys	10.6	10.1	10.0
GMC	6.1	8.4	6.6
Dodge	5.9	5.8	6.3
Whitet	1.8	1.5	2.2
Mack	0.9	1.2	1.5
Studebaker	0.7	1.0	0.9
Others	0.5	0.9	0.9

*First half projected production. †Includes Diamond T.
Source: *Ward's Automotive Reports.*

Can Truck Sales Hit Million in '62?

MARKET ANALYSTS, just starting to peer into 1962, indicate that sale of 1 million trucks is possible next year.

Their optimism is based on these factors:

1. The economy is rising and should continue to climb steadily through the first half of 1962.

2. Defense and highway programs affecting truck sales will be breaking next year.

3. The 12 to 15 per cent of the truck fleet users who have postponed replacement purchases should be entering the market.

• **Coin's Other Side**—But there are also the pessimists who point to this year's lagging sales (best guesstimates peg this year's total registrations at about 915,000). They cite these obstacles:

1. The Kennedy administration's campaign to boost diesel fuel taxes (the drive has been halted temporarily).

2. The continuing feud between auto haulaways and rail transporters has cut fleet sales this year.

3. An anticipated rise in gasoline taxes.

Whichever side you join, truck sales in 1962 are almost certain to show improvement over this year's. A compromise estimate would be about 940,000 to 950,000 units.

Registrations are running 15 per cent behind year-ago levels. *Ward's Automotive Reports* says first half truck production this year hit 574,000 units compared with 725,000 in 1960 and 668,000 in 1959.

Second half truck production schedules are already being increased slightly so that output will reach 1.1 million vehicles vs. 1.2 million last year.

• **Builders Report**—Reactions vary among producers. International Harvester Co., Chicago, says that calendar year sales through the first week of June total 62,842 against 60,635 last year. A good share of the increase stems from IH's recently introduced compact Scout trucks. Production now totals 14,800 units.

White Motor Co.'s H. J. Nave, executive vice president, reports that the Cleveland vehicle producer expects sales will be 7.3 per cent higher in 1961 than in 1960. He's looking

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for another 6.5 per cent hike in 1962. White registered 14,179 trucks in 1960, excluding its heavy duty Diamond T subsidiary which posted sales of 2421 units.

Another heavy duty builder, Mack Trucks Inc., Plainfield, N. J., says cautiously that sales seem to be picking up, but it's not willing to state that this year's sales will be equal to last year's 10,876. Mack suffered almost a 20 per cent loss in 1960 compared with 1959.

• **Major Battlers**—As always, Ford and Chevrolet are waging the hottest struggle. Ford reports sales through May totaled 123,800. Chevrolet claims 122,600. A year ago, the five month registration totals were 122,193 for Ford and 137,700 for Chevy. Ford's Econoline series of compact trucks is accounting for 17 per cent of its sales. Chevy's Corvair compacts are taking 13 per cent.

Ward's production figures show how each maker is doing:

First Half Truck Output
(Thousands of units)

	1961	1960
Chevrolet	74.2	239.2
Ford	72.6	200.8
IH	75.4	70.8
Willys	60.9	78.4
GMC	34.9	60.8
Dodge	34.0	41.8
White	9.0	9.7
Studebaker	4.1	8.6
Others	9.0	14.3

• **Diesels Slump**—Sales of diesel engines fell to less than 25 per cent of last year's factory truck deliveries compared with almost a third in the previous two years. Outlook: 1961 will be no better and probably will be less. Truckmakers bluntly state that pressure on Congress to boost diesel fuel taxes has scared off many buyers. In the last three years, the Automobile Manufacturers Association reports that less than 1000 diesel powerplants have been installed in trucks rated below 26,000 lb gross vehicle weight (gvw).

But builders are confident that diesel use will grow and that it will spread to lighter trucks. Several of them point to Great Britain where all taxicabs and about 90 per cent of the light trucks are dieselized. The ultimate fuel economy makes up for higher weight and initial cost penalties. IH says the price differential between diesel and gasoline engines ranges from $500 to $1500, depending on size.

General Motors' Allison Div. has just made an automatic transmission available for diesels.

Studebaker-Packard Corp. has started putting 130 hp diesels into its medium duty trucks. It's buying the engines from GM's Detroit Diesel Div. Ford has less than 1 per cent of its production dieselized, but the word is that it plans to move further into the field next year. It now buys its heavy duty diesels from Cummins Engine Co. Inc., Columbus, Ind. It also is testing a small diesel made by Ford of England.

Chevrolet Div. has been a sleeper. It hasn't pushed diesels, but next year it quietly plans to install about 700 of the four and six cylinder powerplants in medium and light trucks so it can test them on short haul, continuous operation in the South. If the trial is successful, Chevrolet reportedly has its own diesel engine design—a four cycle, V configuration—which it will put out for bids later in the year.

• **Materials** — Although no major change in truck designs is scheduled for 1962, builders are making a gradual shift toward lighter materials so they can increase payload capacities. It's a seesaw struggle, depending on materials costs and specific weight problems. Mack, for example, says it has tried aluminum for several structural parts, but has been forced to switch back to steel. It has also tried glass fiber materials for fenders and skirts.

White is the only producer that's using a glass fiber truck cab. The division is specifying glass fiber fenders on other truck models and plans to use plastic for hoods too.

Another of the large truckbuilders tells STEEL that where weight is a problem it plans to offer aluminum as an optional material for several parts in 1962, such as step tanks for gasoline, transmission cases, wheel hubs, and spring brackets and caps. For 1963, this builder plans to go to high strength, low alloy steel for most of its medium and heavy duty truck frames.

U. S. Auto Output

Passenger Only

	1961	1960
January	415,857	688,690
February	364,385	659,298
March	407,959	654,241
April	446,739	582,869
May	542,303	611,260
5 Mo. Totals	2,117,243	3,196,358
June		613,136
July		434,377
August		305,514
September		407,691
October		617,972
November		597,638
December		523,422
Total		6,696,108

Week Ended	1961	1960
May 20	123,528	154,755
May 27	129,142	142,359
June 3	85,645	115,068
June 10	127,256	139,423
June 17	128,566†	137,641
June 24	128,000*	142,247

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.

Eaton Announces New Axle

FINGERTIP selection of gears is featured in the new, three speed, tandem axle introduced by the Axle Div. of Eaton Mfg. Co., Cleveland. A three position switch on the gear shift knob permits axle shifting into high, intermediate, and low within each of the five forward gear speeds. The arrangement, which provides close steps between 15 forward speeds, enables operation of the truck at maximum average speeds, regardless of the terrain. Eighty-five per cent of the parts in the three speed, tandem axle are interchangeable with parts in Eaton's two speed axle.

controlled microstructure eliminates extra finishing

High production items like these wrench sockets require steel of uniform chemistry, structure and hardness. SNAP-ON TOOLS CORPORATION specifies Aristoloy 8630. They report that uniform quality and predictable machinability mean less down-time for tool changes and the elimination of extra finishing operations.

Aristoloy *electric furnace* steels are no accident. They result from controlled melting of selected scrap, careful rolling, and precise heat treating. Bars and billets produced are of controlled hardness and microstructure.

Call your local Copperweld representative for complete information—or write for PRODUCTS and FACILITIES CATALOG.

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DIVISION OF
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STEEL COMPANY

ARISTOLOY STEEL DIVISION 4005 Mahoning Ave., Warren, Ohio • EXPORT: Copperweld Steel International Co., 225 Broadway, New York 7, N. Y.

Weighs a 64% cost reduction

Fastener survey by RB&W seeks to deliver maximum holding power per fastener-dollar ... makes possible substantial savings

Since the job of a standard fastener is mainly to hold an assembly together, its *"clamping force"* is what you really want. You can reduce costs by applying this fact and buying fasteners by their *holding power* rather than size.

For example, compare SAE "proof load" and cost ratios of four different hex screws of standard steels.

Grade	SAE Grade 5	SAE Grade 2	SAE Grade 2	SAE Grade 2
Size	¾ x 5"	1 x 5"	1⅛ x 5"	1¼ x 5"
Proof load (lbs)	28,400	16,950	21,350	27,100
Cost Ratio	100%	188%	239%	277%

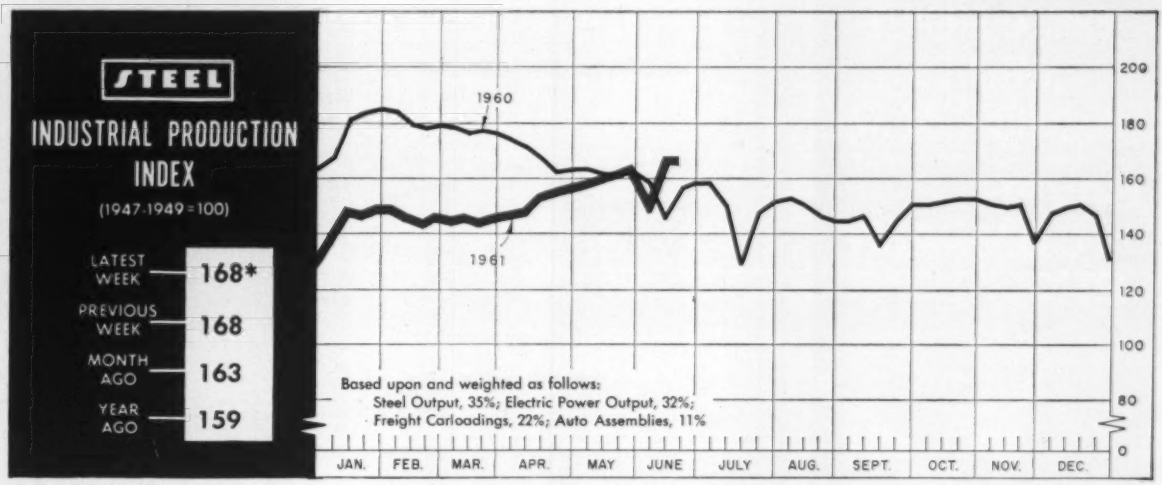
Almost unbelievable. The smallest—the heat treated RB&W High Strength Hex Screw—exceeds all the others in load capacity, can usually be used instead of any of them. But, since it's smallest and weighs less, it also costs you less. 64% less than the 1¼" Grade 2 screw; 58% less than the 1⅛", etc. And because holes can be made smaller, you save on production, too.

Want to get the most from *your* fastener dollars? Let a specialist who best knows the subject of fasteners contribute his knowledge to that of your engineers. Contact Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

RB&W

116th year

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. Sales agents at: Cleveland, Milwaukee; New Orleans; Denver, Fargo. Distributors from coast to coast.



*Week ended June 17.

Production Indexes Bolster Optimism

PRODUCTION INDEXES continue to establish new highs for 1961—in some cases higher than the year ago totals. But there is still some doubt about the near term trend, and you can find isolated references to a "false recovery."

STEEL's industrial production index above has held at 168 (1947-49=100) for two consecutive weeks. That's the loftiest reading since early April, 1960, and places the current trend line significantly above the year ago position, when the economy was on its way down. It is likely that the line will climb higher before the July 4 holiday cuts into industrial activity.

• **Forecasts FRB Index**—For those who have followed STEEL's index closely, the rise in the Federal Reserve Board's total industrial production index came as no surprise. Only the increment—3 points, up to 108 (1957=100)—was news. In only two months, the FRB indicator has regained all but 3 points lost in the recession. If the rate continues, the economy will be well on its way to one of the most dramatic upturns in the postwar era.

The movement of STEEL's index so far in June hints at another step-up in the government's production barometer, but it is too early to pinpoint the advance. If auto-truck production holds at the current level, the monthly total will be slightly better than the seasonal pattern indicates it should be. But the current leveling off tendency in the steel industry is contrary to the normal pattern of an increase for June. However, the auto and steel industries are not solely responsible for the boost in the FRB index. Among the durable goods, every category showed improvement in May. A repeat performance in June would overcome any weakness in steel or even autos. In ad-

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	1,975[1]	1,985	1,739
Electric Power Distributed (million kw-hr)	15,200[1]	15,004	14,441
Bituminous Coal Output (1000 tons)	8,475[1]	7,650	8,738
Crude Oil Production (daily avg—1000 bbl)	7,050[1]	7,054	6,840
Construction Volume (*ENR*—millions)	$403.4	$662.0	$583.2
Auto, Truck Output—U. S., Canada (*Ward's*)	162,145[1]	161,808	173,574
TRADE			
Freight Carloadings (1000 cars)	600[1]	593	650
Intercity Truck Tonnage (changes from year ago)	−0.1%	−0.5%	−3.1%
Business Failures (Dun & Bradstreet)	349	254	283
Currency in Circulation (millions)[2]	$32,299	$32,198	$31,976
Dept. Store Sales (changes from year ago)[2]	+5%	+1%	+2%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$27,203	$29,080	$26,486
Federal Gross Debt (billions)	$290.0	$290.1	$289.2
Bond Volume, NYSE (millions)	$26.6	$29.9	$25.1
Stocks Sales, NYSE (thousands of shares)	16,320	19,722	17,701
Loans & Investments (billions, adjusted)[3]	$111.4	$112.1	$104.0
U. S. Govt. Obligations Held (billions)[3]	$31.4	$31.4	$26.0
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	223.0	223.1	231.8
All Commodities[6]	118.8	118.9	119.6
Commodities Other than Farm & Foods[6]	127.8	127.8	128.3

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.

BRMCO BRONZE MATCHES PHOSPHOR BRONZE

SAVES COMPANY 21%

Detch Electric Company cut material costs 21% by switching from phosphor bronze to BRMCO Bronze—and didn't sacrifice any necessary material characteristics. In fact, BRMCO Bronze ranked higher in uniformity, workability, and electrical conductivity. Its spring quality and corrosive resistance are excellent.

BRMCO Bronze, developed for the electrical and electronics industries, is suitable for most applications where phosphor bronze is used . . . *yet costs at least 15 cents a pound less!* Used mainly in the electrical field, it is also suitable for applications in other industries where its superior characteristics and lower cost are primary considerations.

Write or call today for testing samples and full specifications. If you phone, call EDison 7-4434 (Bridgeport—collect) and ask for Larry Hayden, field service department.

FINE QUALITY ALUMINUM, BRASS AND BRONZE IN STRIP AND ROLLS

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Bridgeport Rolling Mills Company
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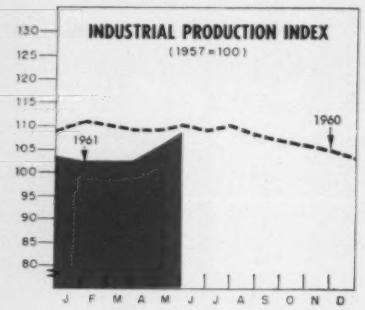
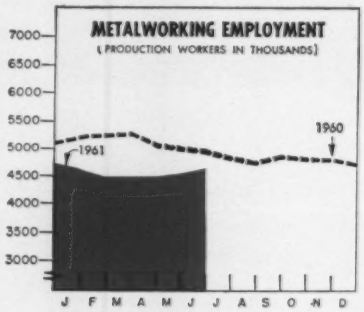
THE BUSINESS TREND





(Seasonally adjusted)

	Total Production		Total Mfg.		Durables Mfg.	
	1961	1960	1961	1960	1961	1960
Jan.	102	111	101	112	95	111
Feb.	102	110	101	110	94	109
Mar.	102	109	102	110	95	108
Apr.	105	109	105	109	99	106
May	108*	110	108*	110	103*	107
June	...	109	...	110	...	105
July	...	110	...	110	...	106
Aug.	...	108	...	108	...	104
Sept.	...	107	...	107	...	102
Oct.	...	106	...	106	...	101
Nov.	...	105	...	104	...	98
Dec.	...	103	...	103	...	96
Avg	...	108	...	108	...	104

Federal Reserve Board. *Preliminary.
Charts copyright, 1961, STEEL.

1960	Prim. Mtls.	Fab. Prod.	Machinery	Elec. Mchy.	Trans. Equip.
May	993	836	1.159	855	1.174
June	970	840	1.154	859	1.127
July	924	817	1.130	850	1.105
Aug.	910	819	1.112	861	1.036
Sept.	905	835	1.104	877	1.135
Oct.	891	834	1.087	839	1.149
Nov.	871	816	1.087	867	1.153
Dec.	851	794	1.081	844	1.125
1961					
Jan.	838	771	1.075	842	1.068
Feb.	829	755	1.077	835	1.012
Mar.	833	750	1.076	830	1.013
Apr.	846	762	1.081	828	1.015
May	866	785	1.081	834	1.057

U. S. Bureau of Labor Statistics.

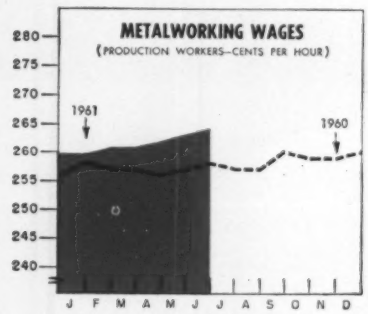
dition, there seems to be no stopping the continued advance of the nondurables.

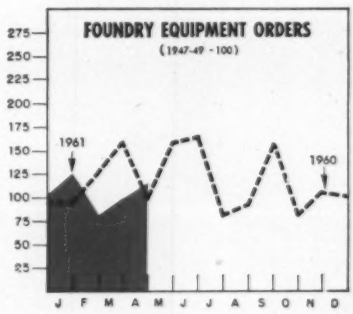
• **Short Term Uncertainties**—But July is another question. And again it is possible that steel and autos will offset each other, but in reverse of the June pattern. Auto producers will close shop early for model changeover, which will cause the chartmakers some headaches when they adjust their figures seasonally. Output may dip as low as 300,000 units, far below the normal pattern. On the other hand, steelmakers are talking about a better-than-average month in comparison with past performance. July will be down, but it could still end up in the plus column of the FRB index if the dip is less than seasonal.

As for output of electricity and railroad freight carloadings (the other two indicators in STEEL's index), both could contribute to summer strength. Electricity output is showing the first signs of the long summer climb to new peaks in late August. It is running 4 to 6 per cent ahead of the year ago pace. Carloadings are still well behind the 1960 rate, but the gap is closing rapidly, and the crossover should come in July.

• **Requiem for Doubters** — Many metalworkers, who claim the epithet of "mild recession" in 1960 was a misnomer, are still expressing caution about the upturn, especially those in the capital goods industries. Despite the slightly optimistic news concerning spending for capital goods in the second half (Securities & Exchange Commission's report—June 19, p. 48, and STEEL's semiannual survey—see July 3 issue) many are adopting a "wait and see" attitude. Perhaps some of the uncertainty was laid to rest last week with the announcement by the Commerce Department that new orders for durable goods (seasonally adjusted) advanced in May for the fourth consecutive month. At $14.9 billion, they were the highest since October, 1959. In addition, Commerce reported that sales (shipments) also advanced, reaching $14.6 billion, seasonally adjusted. This made three months in a row in which orders topped shipments, raising the level of backlogs.

But some well known economists (in and out of government circles) still contend that the recovery could flop this summer, resulting in





1960	Prim. Mtls.	Fab. Prod.	Ma-chinery	Elec. Mchy.	Trans. Equip.
May	282	245	257	229	273
June	282	245	257	230	274
July	281	245	256	230	274
Aug.	280	246	256	230	275
Sept.	281	248	258	232	281
Oct.	281	248	258	232	281
Nov.	279	246	259	233	279
Dec.	283	247	260	233	279
1961					
Jan.	285	246	261	235	278
Feb.	285	247	261	235	278
Mar.	286	247	262	235	277
Apr.	288	249	263	236	279
May	289	250	263	236	280

U. S. Bureau of Labor Statistics.

	1961	1960	1959
Jan.	123.7	95.5	127.4
Feb.	81.8	128.6	237.1
Mar.	99.1	159.9	166.6
Apr.	115.2	97.9	154.2
May	....	159.0	157.0
June	....	161.8	125.1
July	....	80.0	110.7
Aug.	....	92.4	134.1
Sept.	....	158.1	131.3
Oct.	....	81.7	140.8
Nov.	....	106.5	131.2
Dec.	....	101.2	95.9
Avg	....	118.8	142.6

Foundry Equipment Mfrs. Assn.

either a continuation of the recession or, at best, stagnation at a fairly high level for a few more months. Those views are receiving less and less attention, though, as good news increases. Recent improvement in employment (for metalworking's position, see tables and graphs above) and a lengthening of the workweek are being felt where it counts most—in the consumer's pocketbook. Commerce reported last week that personal income set a record in May at a seasonally adjusted annual rate of $413.7 billion, up $2.4 billion from the April rate. It marked the third month of improvement.

Profits Moving Up

One thing that could go a long way toward brightening the outlook for capital goods spending: A break in the downtrend of corporate aftertax profits. They totaled $22.6 billion last year and were at an annual rate of only about $19.4 billion in this year's first quarter.

But the outlook is for fairly rapid improvement in this area too. In an informal poll last week, a group of business analysts was asked about expectations for aftertax profits. The median estimate was $21.5 billion (annual rate) in the current quarter, advancing to an annual rate of $24.4 billion in the fourth quarter. Another group of bank experts in this field, using government data and computers, came up with almost identical forecasts —$21.4 billion in the second quarter and $24.8 billion in the fourth period.

Trends Fore and Aft

• Business failures reached 1545 in May, the second highest total of the year, reports Dun & Bradstreet Inc. But liabilities totaled only $80.5 million, the lowest figure for the year.

• New orders for foundry equipment snapped out of a two month slump in April, reports the Foundry Equipment Manufacturers Association. (See table and graph above.)

• Government activity has contributed and is continuing to contribute to the recovery, declares John W. Harriman, economist for Tri-Continental Corp., New York investment firm. "But the impact . . . has been minor. Business shifted from recession to recovery essentially under its own steam."

Coming July 3 IN STEEL

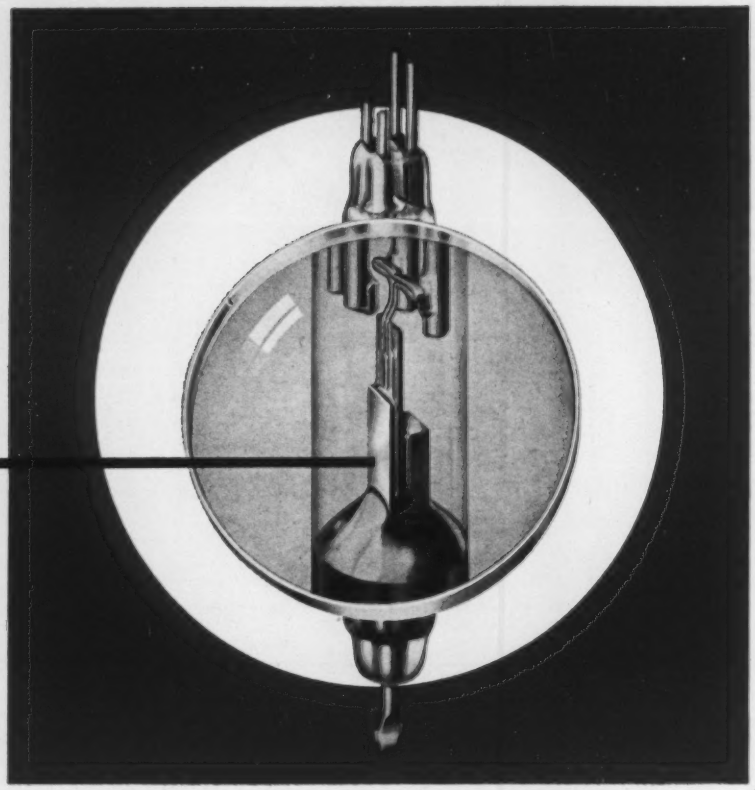
Capital Equipment Ordering Plans

Check STEEL next week for a semiannual report on what metalworking plans to spend in the second half of 1961. The editors went to 1300 managers who buy more than one-third of all equipment purchased by U.S. metalworking to learn what their companies will do in the next six months.

Their replies will tell you the orders to expect in these equipment categories: Machine tools, material handling, presses, heat treating, surface cleaning and finishing, joining and assembly, testing and inspection, steelmaking, foundry, and office. The answers also can give a clue to what you should be spending.

BILLIONS OF BENDS

Prove SANDVIK SPRING STEEL'S *Fatigue Resistance*



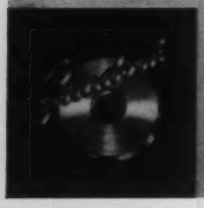
Here is another example of the extraordinary fatigue life you can get from Sandvik Spring Steel.

C. P. CLARE & CO. uses Sandvik 12W12C1 Steel as the spring support for the armature assembly in their line of Mercury-Wetted Contact Relays. Here, from a letter by Mr. C. H. Smith is what they say about it.

"The steel piece deflects through a complete cycle – once for each operation of the relay. Sandvik Steel was chosen for its excellent fatigue resistance. When you realize Clare HG relays have a life expectancy measured in billions of operations you can see the importance we place on selecting top grade materials."

The steel used for this application is only one of Sandvik's many types of specialty spring steels. Each type provides consistent, predictable results for a specific range of application.

For more information on Sandvik Specialty Steels and how they can be applied advantageously, use the coupon below or send us a note on your letterhead.



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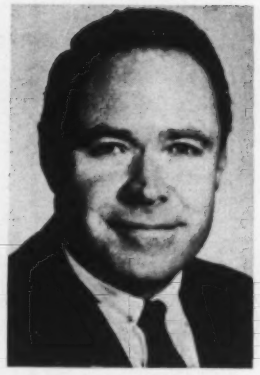


W. O. CHAMBERLIN
Brooks & Perkins v. p.

JOHN C. SECREST
AMC purchasing v. p.

THOMAS SMITH
Dynamic Gear exec. post

JOHN R. PURDY
CF&I Pueblo plant supt.

W. O. Chamberlin was elected vice president-marketing, **Brooks & Perkins Inc.**, Detroit. He joined the firm in late 1960 as director of marketing.

John C. Secrest was elected vice president-purchasing, **American Motors Corp.**, Detroit. He was a purchasing executive with Ford Motor Co.

William R. Heck was made manager-mechanical equipment sales at **Sutton Engineering Co.**, Pittsburgh.

Henry A. Sterner was made sales manager, Alloy Bar Div., **Bethlehem Steel Co.**, Bethlehem, Pa. **Thomas D. Boak** was made assistant sales manager. Mr. Sterner succeeds the late **Harrison E. Graffin Jr.**

Emil E. Pagel was made director of purchases, **Hughes Tool Co.**, Houston, to succeed the late **Earl R. Cobden. Gerald F. Bevill** was made assistant director of purchases, succeeding Mr. Pagel.

Thomas Smith was appointed vice president-marketing and manager of **Dynamic Gear Co. Inc.'s** new Western Div., established in Van Nuys, Calif.

Milton E. Smith was made manager of **Ford Motor Co.'s** stamping plant in Buffalo. He succeeds **Mark Kaiander**, who returns as manager of the Monroe, Mich., plant.

Robert J. Jacobs, vice president-general manager, Waldron-Hartig Div., **Midland-Ross Corp.**, Cleveland, assumes temporarily the general management of the J. O. Ross Engineering Div. following retirement of **Chester J. Schmidt**, its vice president-general manager.

Frank Nascenzi was made director of the Administration, Manufacturing & Engineering Div., **Burroughs Corp.**, Detroit. He joins Burroughs after 19 years at Westinghouse Electric Corp., where his last post was general manager of industrial products, Springfield, Mass.

John R. Purdy was appointed superintendent of **Colorado Fuel & Iron Corp.'s** Pueblo, Colo., coke plant. He had been assistant superintendent of the coke plant since May, 1960, and is replaced by **Walter E. Burns.**

John E. Arpe was appointed vice president-manufacturing at **Heil Co.**, Milwaukee. For the last two years, he has served as division manager of central manufacturing.

Ben Ragland was named to head planning, development, and marketing of dust collection and air pollution control equipment at **American-Standard Industrial Div.**, Detroit, American Radiator & Standard Sanitary Corp.

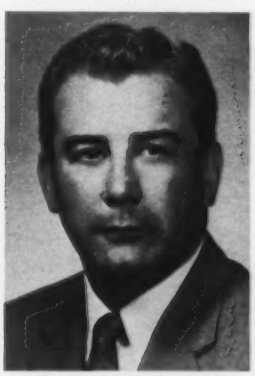
E. V. Mort was made general manager for strip sales in **Jones & Laughlin Steel Corp.'s** Stainless & Strip Div. His offices are at the division's plant in Youngstown.

Jerome A. Ziv was elected a vice

HENRY A. STERNER
Bethlehem div. sales mgr.

EMIL E. PAGEL
Hughes Tool purchasing dir.

FRANK NASCENZI
Burroughs executive



E. V. MORT
J&L strip sales mgr.

DANIEL A. PORCO

EUGENE A. MARCH

Crucible Steel vice presidents

GEORGE F. FARLEY

ROBERT J. SAGGAU

promotions at Spincraft Inc.

president of **M. S. Kaplan Co.**, Chicago.

Daniel A. Porco and **Eugene A. March** were elected vice presidents of **Crucible Steel Co. of America.** Mr. Porco was assistant to the president; Mr. March, who becomes vice president-technology, was director of technology.

Alan Harrison was appointed president, **Vermont Tap & Die Div.**, Vermont-American Corp., Lyndonville, Vt. **Jerry Hammang** was made general manager of the division.

Thomas R. Laidlaw was appointed purchasing agent, **Inland Steel Products Co.**, Milwaukee. He was assistant purchasing agent for A. George Schultz Co.

Stanley Works, New Britain, Conn., appointed **Bennett Lord** manager, industrial hardware; and **Edward M. Haines** to the new post of vice president-engineering for the company.

Spincraft Inc., Milwaukee, appointed **George F. Farley** executive vice president and general works manager; and **Robert J. Saggau** director of sales in charge of contract and product marketing.

Fred J. Purdy was made manager of sales, Westing-Arc Dept., Buffalo, **Westinghouse Electric Corp. Philip W. Mahin**, former market planning specialist, was made administrative assistant to Mr. Purdy.

Howard J. Seel was promoted to vice president - engineering, Harris - Seybold Div., Cleveland, **Harris-Intertype Corp.** He is succeeded as chief engineer, Cleveland division, by **Arthur G. Royer.**

Norman F. Kelley was made assistant divisional sales manager of the New Bedford, Mass., Div. of **Revere Copper & Brass Inc.**

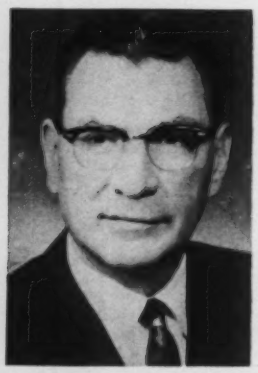
Richard P. Castanias was made national sales manager of Univac scientific computing systems of **Univac Div.**, Sperry Rand Corp., New York. **William R. Lonergan** was named manager of the division's product planning and applied programing.

Arthur G. Baitz, former director of marketing at **Robertshaw-Fulton Controls Co.'s** headquarters in Richmond, Va., was named an assistant vice president of the corporation and general manager of its Eastern Research Center at King of Prussia, Pa.

Charles W. Baker was named assistant to the president of **National Screw & Mfg. Co.**, Cleveland. Former director of technical sales and research, he is succeeded by **F. W. Lawrence.**

David W. Marchant was promoted to president and general manager, Koehring Div., Milwaukee, **Koehring Co.** He is succeeded as president and general manager of Koehring - Waterous Ltd., Brantford, Ont., by **Kensal R. Chandler**, former assistant vice president-sales, Koehring Div. Mr. Marchant succeeds **E. A. Brugger**, recently as-

BENNETT LORD



EDWARD M. HAINES

appointments at Stanley Works

DAVID W. MARCHANT

KENSAL R. CHANDLER

promotions at Koehring Co.

How To Engineer A Better Product Finish...FOR TOMORROW

Where product or component finishes involve critical limits—in areas of tolerance, unit-cost or rate of production—abrasive engineering discussions often continue late into the night. And, whether the subject be planning for a new product or a cost-reduction problem on current production—*the man to sit in with you is your Carborundum field engineer.* He brings to your office a tremendous accumulation of practically tested abrasive knowledge and experience. Trained in all major abrasive methods employing either belts, discs, wheels, abrasive grains and powders—he recommends impartially. For maximum efficiency with abrasives, this help is always available from your Carborundum district office. A phone call will do. **CARBORUNDUM**

FRED M. HEDDINGER
heads new Westinghouse dept.

PERCY S. GOUGH
American Hoist marketing dir.

JAMES M. CLONEY
Ozalid Div. gen. mgr.

CHARLES C. DAVIS
Alco products sales mgr.

HARRY W. CARPENTER JR.
joins Vard Div.

C. C. PITTS
Petro-Electronics v. p.

LESLIE M. NELSON
Cleveland Instrument post

ROBERT P. HINDMAN
Armco works manager

CHARLES R. LARSON
Prab Conveyors chf. eng.

signed to a post with the company's European and other overseas activities.

Leslie M. Nelson, former assistant sales manger, was named manager of sales engineering by **Cleveland Instrument Co.,** Cleveland, subsidiary of Bendix Corp. He succeeds **Fred W. Witzke,** recently promoted to vice president of the company.

At the Butler, Pa., Works of **Armco Steel Corp., Robert P. Hindman** succeeds **Roy P. Tooke,** retired, as manager; and **William R. Gealey** succeeds Mr. Hindman as general superintendent.

Charles R. Larson was appointed chief engineer of **Prab Conveyors Inc.,** Detroit. He held a similar post with Hapman Conveyors.

Fred M. Heddinger, former assistant to the general manager, Semiconductor Dept. of **Westinghouse Electric Corp.** at Youngwood, Pa., was named to head a new group to be known as the Semiconductor Molecular Electronics Dept.

Percy S. Gough was appointed director of marketing, a new post at **American Hoist & Derrick Co.,** St. Paul. He is responsible for the entire marketing activity of American Hoist, its divisions and subsidiaries.

James M. Cloney was appointed general manager, **Ozalid Div.,** Binghamton, N. Y., General Aniline & Film Corp., effective July 1. **Harold W. Metcalf,** who has been serving as acting general manager of Ozalid, will assist Mr. Cloney.

Charles C. Davis was made industrial sales manager for forge and spring products manufactured by **Alco Products Inc.,** New York. He previously headed company sales in the Southwest.

Harry W. Carpenter Jr. joined **Vard Div.,** Pasadena, Calif., Royal Industries Inc., as manufacturing engineer in charge of gearing. He was with Gleason Works.

C. C. Pitts was elected vice president and general manager of **Petro-Electronics Corp.,** Denver, subsidiary of Raytheon Co. He was vice president and general manager of Anson Drilling Co. of Bogota, Colombia.

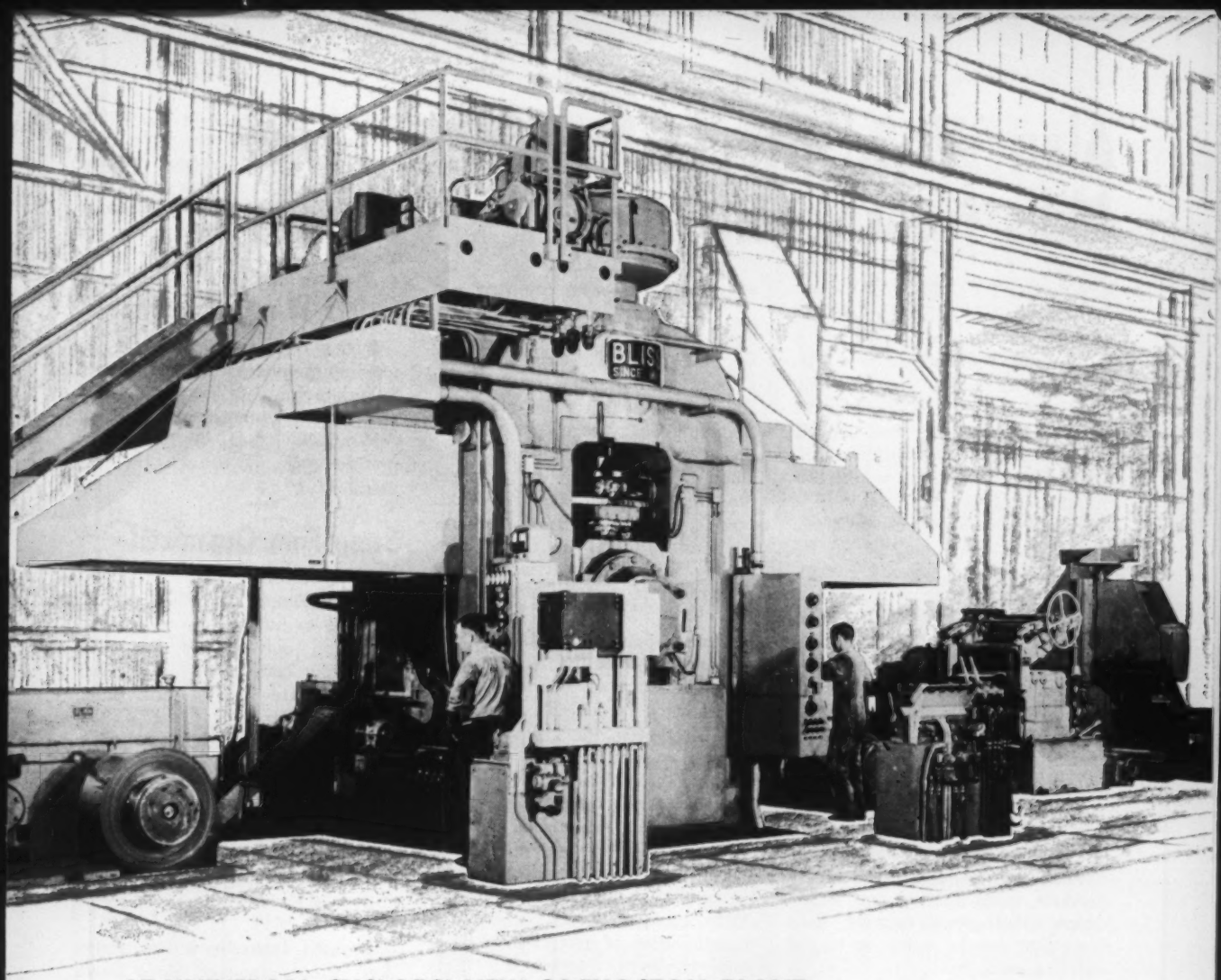
Stanley M. Wells was appointed president, **Lang Wayne Equipment Co.,** Salt Lake City, Utah, subsidiary of Symington Wayne Corp.

R. E. Hunt was made general manufacturing manager, **Ford Tractor Operations,** Ford Motor Co., Dearborn, Mich.

Nelson W. Blakely was appointed assistant general manager of **Wheeling Steel Corp.'s** Yorkville, Ohio, Works. He continues as general manager, Benwood Works.

Maurice S. Hartley was made manager, Cleveland Engineering Div., **Brush Instruments Div.,** Clevite Corp.

Harry D. Curtis was made manager, Detroit Div., **Solar Steel Corp.**



AT UNIVERSAL-CYCLOPS' NEW COSHOCTON PLANT:

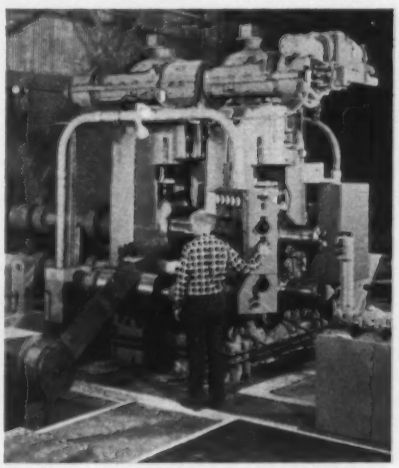
Stainless gets a fine finish fast

All the rolling at Universal-Cyclops Steel Corporation's new stainless strip finishing plant at Coshocton, Ohio, is accomplished on two rolling mills designed and built by Bliss' Rolling Mill Division. Steels rolled include all standard AISI grades in widths up to 24 inches.

Workhorse of the two mills is the 4-high reversing mill shown above. It is ruggedly built to stand heavy rolling stresses developed at speeds as high as 1000 fpm. Auxiliary equipment includes a three-stop coil entry ramp, coil buggy and mandrel-type payoff reel, flattener and feed roll, tension reels and coil buggies.

The two-high Bliss temper mill (right) is used principally for straight chromium grades of stainless providing proper hardness and a lustrous finish to the strip. An unusual design feature is the absence of an entry guide box, eliminating a source of dirt accumulation and strip scratching.

These two mills at Universal-Cyclops are typical of the modern approach to rolling mill design you'll find at Bliss. For other examples of our work, write us today for your complimentary copy of the 84-page Bliss Rolling Mill Brochure, Bulletin 40-B.



BLISS
SINCE 1857

Bliss is more than a name... it's a guarantee

E. W. BLISS COMPANY, Rolling Mill Division, Salem, Ohio

Subsidiary: The Matteson Equipment Company, Inc., Poland, Ohio

Alan Wood Steel's New Mills Near Completion

ALAN WOOD STEEL CO., Conshohocken, Pa., will complete installation of a blooming mill and a 110 in. plate mill this summer. The facilities will permit the company to expand its markets, improve its profitmaking position, and provide the groundwork for further expansion. The $36 million project was initiated in February, 1960, and is the first step in a ten year program. The second phase will be an expansion of melting capacity. (STEEL, Feb. 22, p. 35.)

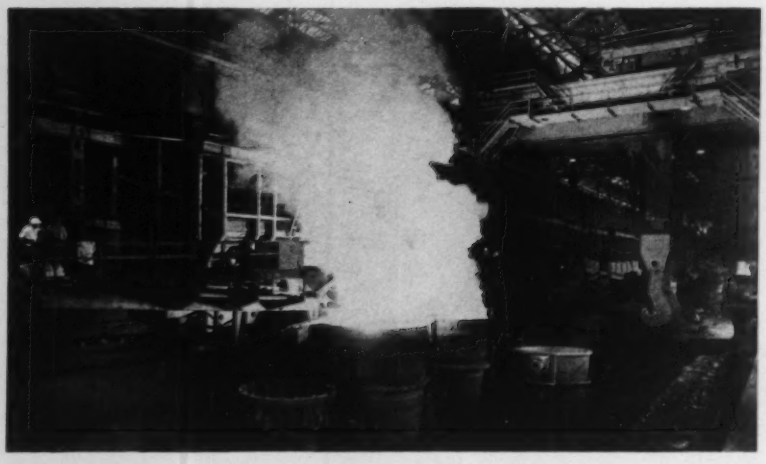
• **More Variety**—When the new facilities are placed in operation, the product mix will include more than 40 per cent plates, with the balance hot and cold rolled sheets. Present production is about evenly divided among the three categories.

Alan Wood looks for stepped up sales to steel service centers, plate fabricators, and shipbuilders. The company also expects to sell in the pressure vessel market and others where alloy steels stronger than those that can be rolled on its old mill are used.

• **Lower Costs**—The company expects to use 85 manhours (including conversion, inspection, and shipping) per 100 tons of plates shipped with the new facilities vs. 200 manhours with the old mill. Assuming an average cost of $3.85 per hour for labor, the saving alone amounts to about $6 a ton of plates produced, says Harleston R. Wood, president. "Other substantial reductions in costs will result from improved yield due to larger sizes of ingots and slabs," he adds.

• **More Expansion Possible** — The new mills will ultimately be able to roll much more steel than Alan Wood now produces. However, says Mr. Wood, the 110 in. mill is laid out so that it can be extended into a combination mill which will produce wide continuous sheets as well as plates. Addition of the continuous hot rolled sheet mill would permit production of wider and better quality sheets than the present 30 in. continuous mill.

Installation of new melting facilities is being considered. "This might be in the form of oxygen converters to replace our open hearths, or electric furnaces to supplement present facilities, or perhaps even one of the new methods still in the laboratory stage," says Mr. Wood.



Rebuild Doubles Open Hearth Capacity

TWO LADLES and a Y-shaped trough are used to tap 600 ton heats of steel from an enlarged open hearth furnace at Granite City Steel Co., Granite City, Ill. The furnace, which previously melted 300 ton heats, has a basic roof and three water cooled oxygen lances for fast refining.

Offers Wire Rope Slings

A new wire rope sling and assemblies manufacturing firm, Brown & Perkins Inc., has been established at 675 New Brunswick Ave., Perth Amboy, N. J. D. W. Perkins is president; W. T. Brown Jr., vice president.

Scrap Firm Organized

Steelmet Inc. has been organized by Alan Amper and Nathan Addlestone to handle ferrous, nonferrous, and alloy scrap for domestic and export consumers. The firm's addresses are 3301 Grant Bldg., Pittsburgh, and P. O. Box 950, Sumter, S. C.

CONSOLIDATIONS

Branson Instruments Inc., Stamford, Conn., acquired **Circo Corp.**, Clark, N. J. The merger combines Circo's experience in metal finishing and material handling with Branson's knowhow in ultrasonic cleaning and nondestructive testing.

Bridgeport Brass Co. will become a division of National Distillers & Chemical Corp., New York, on July 1. Austin R. Zender will remain president of the Bridgeport Brass Div. and will be a member of National's board and chairman of the executive committee.

Cerro Corp., New York, acquired **Viking Copper Tube Co.**, Cleveland, fabricator of thin wall, copper tubing for the air conditioning and control instrument industries. Viking will be operated as a Cerro subsidiary.

Crane Ltd. (Canada), Montreal, Que., acquired **Southern Industries Ltd.**, Marieville, Que., manufacturer of water and sump pumps, pressure systems, circulators, and water softeners. Walter Kuoni continues

to direct operations of this new Crane division as vice president and general manager.

Altamil Corp., Indianapolis, acquired **Clay Wood Products Co.**, Clay, Ky., manufacturer of skids, pallets, and other wood products. Clay Wood Products was formerly operated as a division of Indianapolis Wire Bound Box Co. whose principal manufacturing assets were acquired by Altamil earlier this year. G. W. Thompson is manager of Indianapolis Wire Bound Box Div., Fernwood, Miss.

NEW ADDRESSES

Duraloy Co., Scottdale, Pa., moved its Michigan sales and engineering office to 1025 Maple Rd., Troy, Mich.

Lea-Ronal Inc. moved to 130-19 180th St., Jamaica, N. Y. The facility has 10,000 sq ft of floor area for electroplating solution manufacture and storage, offices, laboratories, and pilot plating and precious metal refining units.

Raytheon Co., Waltham, Mass., moved the Production Equipment Dept. of its Commercial Apparatus & Systems Div. to 225 Crescent St., that city.

Wheeling Steel Corp., Wheeling, W. Va., will move its New York district sales and Export Div. offices to the Morgan Guaranty Trust Bldg., 522 Fifth Ave., New York, N. Y. Leslie Irvine is district manager. John Maschenic is manager of the Export Div.

Hovey Spray Equipment Co., distributor of industrial finishing equipment and systems, moved into a new plant at 1001 Rising Sun Ave., Philadelphia 40, Pa.

International Resistance Co., Philadelphia, moved its Chicago sales office to 6020 Diversey Ave., that city. Howard Larsen is office manager.

Yale Materials Handling Div., Yale & Towne Mfg. Co., moved its Western Parts Depot to 2303 Merced St., San Leandro, Calif. The $300,000 facility also houses the firm's industrial lift truck and tractor shovel sales and service center.

ASSOCIATIONS

New officers of **Malleable Founders Society**, Cleveland, include: President, R. S. Bradshaw, Texas Foundries Inc., Lufkin, Tex.; vice president, J. B. Gutenkunst, Milwaukee Malleable & Grey Iron Works, Milwaukee. Malleable Castings Council (advertising arm of the industry) elected these officers: President, T. J. Kirby, Northern Malleable Iron Co., St. Paul; and vice president, L. D. Auker, Alloy Foundries Div., Eastern Co., Naugatuck, Conn.

American Institute of Steel Construction, New York, elected two new officers: First vice president, R. C. Palmer, R. C. Mahon Co., Detroit; and second vice president, J. Phillip Murphy, Yuba Consolidated Industries Inc., San Francisco.

Fluid Controls Institute Inc., Pompano Beach, Fla., elected these officers: President, R. F. McCormick, Automatic Switch Co., Florham Park, N. J.; first vice president, E. A. Bianchi, Mason-Neilan Div., Norwood, Mass., Worthington Corp.; second vice president, S. J. Reid, Barnes & Jones Inc., Newtonville, Mass.; treasurer, P. K. Rogers Jr., Skinner Electric Valve Div., Skinner Precision Industries Inc., New Britain, Conn.; corporate secretary, H. J. MacDonald, Valve Div., Ft. Washington, Pa., Minneapolis-Honeywell Regulator Co.; and executive secretary, E. R. Rath.

Drop Forging Association opened offices for its new Educational Foundation within its headquarters at 55 Public Square, Cleveland, Ohio. The presidents of ten leading forging companies will be trustees. C. H. Smith Jr., Steel Improvement & Forge Co., Cleveland, will be chairman.

Dr. A. V. Feigenbaum, manager of manufacturing operations and quality control for General Electric Co., has been named president of the **American Society for Quality Control**, Milwaukee. Dr. Feigenbaum maintains offices in New York. L. S. Eichelberger, Wauwatosa, Wis., was elected a vice president.

James F. Lincoln Arc Welding Foundation, Cleveland, appointed C. G. Herbruck secretary. Activities of the foundation will be expanded and intensified in some areas, says Mr. Herbruck, to accelerate progress in design of weldments and structures.

Stanley A. McCaskey Jr., Allegheny Ludlum Steel Corp., Pittsburgh, was elected president of the **American Society of Corporate Secretaries**, New York.

Louis Kettler has been appointed research engineer to the staff of **American Zinc Institute-Lead Industries Association**. Dr. S. F. Radtke is research director of the joint program.

NEW PLANTS

General Atomic Div., San Diego, Calif., **General Dynamics Corp.**, is constructing a metallurgical development and fabrication center in that city. Cost of the 52,000 sq ft facility: About $2 million.

Koller Die & Tool Co. is building a 13,500 sq ft plant at 7231 N. 51st Blvd., Milwaukee, Wis. The firm expects to move into the new facility about Aug. 1.

Hewlett-Packard Co., Palo Alto, Calif., will build a $1.5 million plant in Loveland, Colo. Construction of the first unit will begin in July and is scheduled to be completed early next year. Two additional units will be added later. The company makes laboratory instruments.

Crane Packing Co., Morton Grove, Ill., has established facilities at Poniente 152 No. 679 Industrial Vallejo, Mexico, D.F., for the manufacture of its industrial sealing products. A new company, Industrias John Crane de Mexico S.A., has been formed by the absorption of an established Mexican manufacturer of conveyors and custom engineered products.

How a nut can make (or break) your product's reputation

. . . and even bring in re-orders

A nut comes loose. A wheel comes off. And down comes Billy! No great loss, except perhaps to his dignity. But when a lost nut knocks out a rock drill, or a tractor, or a piece of the heavy equipment that *you* make—then what?

Down goes the machine! *Down* goes production—for no telling how long! *And down goes your reputation as a maker of quality equipment!* You can blame it on the nut, but your customer blames *you!*

This kind of embarrassing and costly "Reliability" failure simply cannot occur when you specify Elastic Stop® nuts for critical bolted connections. For no matter how rugged or repeated the shock or impact, no matter how bone-shaking or constant the vibration . . . Elastic Stop nuts *simply will not work loose!*

Elastic Stop nuts with their exclusive, vibration-damping nylon locking inserts are nothing new. They have been widely used for over 20 years by an increasingly large number of quality-conscious manufacturers who have learned that Elastic Stop nuts give built-in insurance against product failure—the kind of reliability that shows up in customer maintenance records and adds up to reorders. Let us send you information showing how manufacturers have protected the reputation of their products with Elastic Stop nuts. Ask for Bulletin 5901. Dept. S47-660, Elastic Stop Nut Corporation of America, 2330 Vauxhall Road, Union, New Jersey.

ESNA®

for the ring **O** *of reliability*

ELASTIC STOP NUT CORPORATION OF AMERICA

Technical Outlook

SWITCH TO ALUMINUM— Corridor gossip: A major British carbuilder is planning to use aluminum engines exclusively in 1963. That was overheard at the summer meeting of the Society of Automotive Engineers (SAE), St. Louis. Also overheard: The engines will be diecast, have gray iron sleeves.

MACHINING PROBLEM— Corridor tipsters say Buick may drop its V-8 aluminum engine. Reason: Machining problems have brought costs to double original expectations. The firm has released a cast iron, V-6 engine for rush tooling for 1962 models.

HITTING THE HOT SPOTS— Thermocouples made from semiconductors really take high temperatures, Russian scientists report. Combinations like boron carbide or chromium silicide with metallic carbides and borides have a straight line relationship between output (emf) and temperatures up to about 4000° F. Good service life in blast furnace iron, brass, and steel is claimed for such a couple with an outer tube of zirconium boride.

NEW ELECTRON BEAM REFINER—A new electron beam refining furnace employs a remotely located electron gun to minimize flashovers when melting raw powder, sponge, pellets, or loose scrap. The equipment is made by NRC Equipment Corp., a subsidiary of National Research Corp., Cambridge, Mass.

ROCKETS GETTING RELIABLE— A launching reliability of 97 per cent has been established for the engines that propel the Atlas, Thor, Jupiter, and Redstone, claims Rocketdyne Div., Canoga Park, Calif., North American Aviation Inc. The firm's manager of reliability, C. C. Davenport, says that 100 per cent is a realistic goal.

ELECTRIFIED FLAME HOTTER— Passing high voltage, low amperage electrical energies through a flame increases its heat output, claims Combustion Research Inc., Pittsburgh. Temperatures up to 6000° F are reported with ordinary fuels. A natural gas-air flame will melt tantalum (5400° F), for example. Possible uses, says the firm, include open hearths, fluidized beds, submerged combustion techniques, glass melting, and chemical heat sources. Power so far has been provided at 60 cycles, 2000 volts, 12 amperes—values easily obtained in most plants.

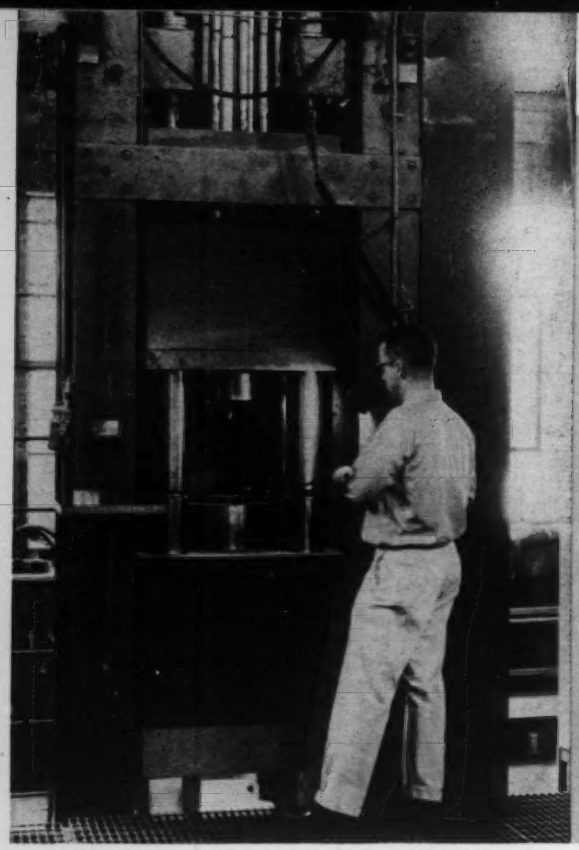
CERAMIC HELPS REACTORS— Boron silicide is being made in commercial quantities by Allis-Chalmers Mfg. Co., Milwaukee. The lighter-than-aluminum ceramic can take 2500° F for long periods, the firm claims. The composition (which contains 60 to 70 per cent boron) is expected to make significant contributions to missiles, rockets, and improve the operating efficiency of atomic reactors. It is readily formed and machined.

WELDED RAILS GO PLACES—Railroads have stepped up installation of welded rails, states Chemetron Corp., Chicago. More than 1200 miles were laid in 1960, 13 times as much as in 1954. The firm claims it produces 40 per cent of the rails welded in the U. S. It says they cost $1000 less per mile to install.

THROWAWAY CARBURETORS— Instead of expensive diecast and machined components, small, two cycle engines will be equipped with carburetors costing less than $2.50, claims Carter Carburetor Co., St. Louis. The "throwaways" will be made of stampings and extrusions, press fitted. Fuel economy for such small engines is not considered a factor.

IMPROVES FORGING DIES—Numerically controlled machining is a superior method of producing forging dies, states Wyman-Gordon Co., Worcester, Mass. Superior finish, consistent repeatability, and greater accuracy are achieved when compared with conventional methods.

PURE MOLYBDENUM WIRE — Wah Chang Corp., New York, says it produces high purity molybdenum wire for spray metallizing and plasma arc applications.



At 85 mph, Press Ram Gives Formed Parts Special Properties

This machine has proved its prowess at high energy rate forming . . .

• **AFTER SEVERAL MONTHS of testing and trials, American Brake Shoe Co., New York, is ready to put its big, high energy rate forming machine to work.**

The machine is a vertical Dynapak, built by General Dynamics' Advanced Products Dept., San Diego, Calif. It's installed in Brake Shoe's Mahwah, N. J., Research Center. The Model 1810 delivers up to 431,000 ft-lb of energy at ram speeds that can exceed 85 mph.

Brake Shoe spokesmen say they will use Dynapak to greatest advantage by forming high quality forgings for the aerospace industries. "In those jobs, expensive metals are subjected to severe deformation to attain intricate shapes, high reliability, uniformity, and exacting dimensional tolerances. Increased forging costs due to short run requirements would be compensated for by reduced metal loss, elimination of much (or all) final machining, and, in some cases, longer fatigue life."

• **The machine moves metal up to 100 times as fast as conventional rates.**

The machine's ram, fired by closely controlled pneumatic power (STEEL, Nov. 3, 1958, p. 41), travels 250 to 1500 in. a second. It can be made to forge, extrude, compact, and blank. In addition to forming carbon and stainless steel, copper, and aluminum, it is capable of processing metals that are conventionally difficult or impossible to work, say company metallurgists.

High temperature metals, including tungsten, molybdenum, titanium, columbium, and zirconium, are in the machine's range.

• **The high velocity produces some significant advantages.**

"Dynapak's high ram velocity creates tremendous abrupt pressures within the die cavity. The high pressures cause severe deformation, and the metal moves faster and farther than when it is formed by conventional methods. Even tough, hard, or brittle materials exhibit a plastic behavior . . . and flow smoothly and evenly into every die opening.

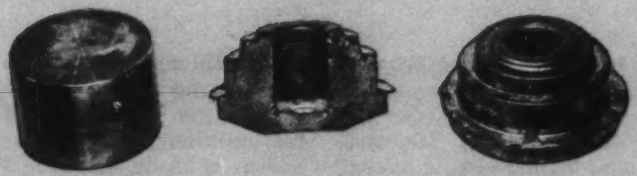
"Compared with normal forging techniques, Dynapak is capable of forming thinner sections, parts with superior grain flow, and greater strength, finer surface finishes, and closer dimensional tolerances," says the company.

Summing up what they've learned, the engineers cite three advantages of the process: 1. Since intricate shapes, thin sections, and close tolerances can be produced, there's little or no finish machining required on many parts. 2. Precise filling of the dies means that less billet stock is required. This, coupled with fewer machining chips, means material costs can be cut. 3. Since sometimes the machine can do in one blow what normally requires several (with reheating), and since machining can be reduced, production rates can be higher than normal.

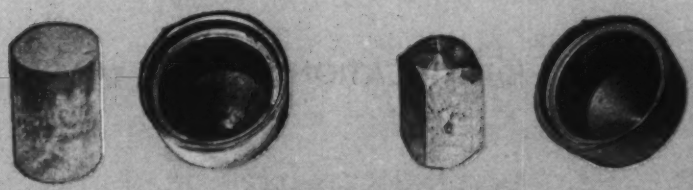
• **It's a special process.**

It won't compete where conventional materials are formed into rel-

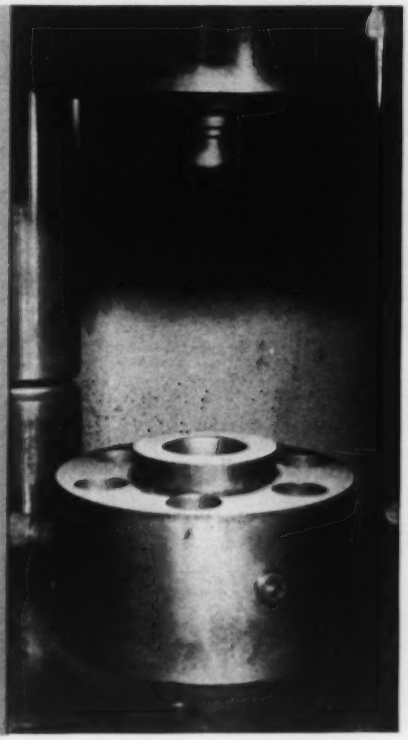
Test Parts



This is a tough pitch copper nozzle for a steel mill oxygen lance. It's normally machined from bar stock. The billet (left) weighs 9.1 lb, the finished nozzle 8.9 lb. It has a 1¼ in. hole that's 2½ in. deep



At right, an SAE 4130 steel piston cap for a hydraulic landing gear strut formed from the adjacent 2 by 2 in. billet heated to 2150° F. With one hit (see below), the part is formed to a wall thickness of 0.018 in., ±0.005 in. Concentricity is held to ±0.010 in. At left: Same part made from copper powder blank. Dies for the part are shown at right



of parts like these. Tolerances and material costs are critical

atively simple shapes, say the firm's metallurgists. In that area, they feel the hammer or press will be more economical.

"Production rates of several hundred simple forgings an hour have been reached on conventional equipment. The productivity of Brake Shoe's Model 1810 is restricted to the length of its cycle time, 105 seconds."

• The company has some special jobs in mind.

The engineers have other work they intend to try on the machine.

First, they'll try extrusions.

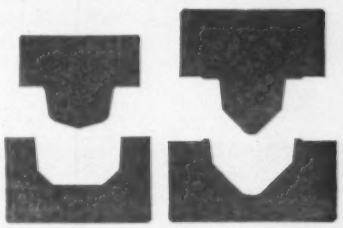
Second, they will try to coin castings to get grain refinement and better size control.

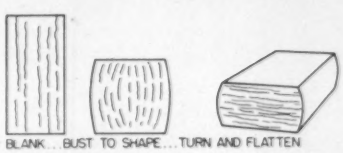
Third, they are expecting an order that will let them try closed cavity molding (see STEEL, Apr. 25, 1960, p. 111). Heated blanks are forced through an orifice into a contoured, vented die cavity, filling the cavity. It has been likened to steel diecasting.

They will continue to work on compacting powdered metals.

To Make This Shape

By Conventional Methods
TWO DIES, MULTIPLE HITS





By Dynapak
ONE DIE, ONE HIT

Conventionally, this cup requires at least four blows, including blank preparation (bottom left). Then it's trimmed and machined inside and out. Dynapak hits it once, and only the flash ring is machined off

How to Prevent Premature

• GREAT SAVINGS in time, effort, and expense can be made by checking out premature ball bearing failures caused by poor maintenance, says Fafnir Bearing Co., New Britain, Conn.

Better than 85 per cent of all premature failures are caused by poor maintenance, the company estimates. Of those, the majority are due to faulty mounting, improper lubrication, the intrusion of dirt or foreign material into the bearings, and poor handling practices.

Such failures account for a considerable portion of replacement sales. (The replacement market for antifriction bearings is $210 million annually, industry observers estimate.)

To show customers how mainte-

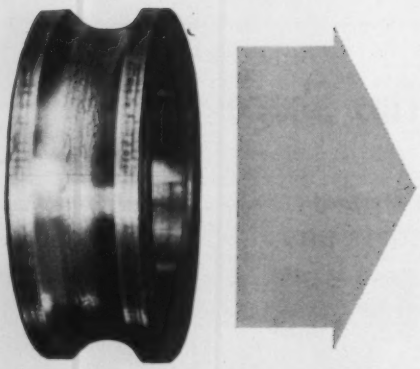
EFFECT

IDENTIFICATION

EARLY FATIGUE FAILURE

Flaking or Spalling of Raceways—Spalling is caused by a granular weakening of the bearing steel. The failure begins as a small fracture of the steel's internal structure. It progresses to the surface of the race where particles of metal flake away—as shown in the photograph.

Noisy Bearing Operation—Because of the rough race surface and the loose metal chips, there will be an increase in bearing vibration and noise.



CONTAMINATION

Scoring, Pitting, Scratching—Failure caused by large pieces of dust leaves scratches and pits around the periphery of the race and also scores the ball. The action is similar to lapping. Failure may cause an intermittent noise. Dirt in the bearing is, of course, the best indication of this type failure.

Rust—Rust on the outside diameter of the outer ring will not usually interfere with operation, but rust in the bore affects the important inner-ring-to-shaft fit. Rusty raceways or ball surfaces prevent further use.

MISALIGNMENT

Retainer Fracture—The retainer spaces the balls and guides them around the raceway. When a ring is misaligned, the balls are driven against the race shoulder, and a stress point is set up between the ball and its retainer pocket. The pocket will flex and possibly fracture the retainer.

Ball Path—With a ring misaligned, the ball path on the nonrotating ring will run diagonally from one race shoulder to the other.

Ball Bearing Failures

nance can influence ball bearing life and costs, Fafnir has set up a series of traveling maintenance seminars. To date, the company has held 140 meetings for almost 4000 maintenance men representing 800 important industries.

Instruction covers such things as proper mounting to prevent damage and premature failure under operating conditions, bearing overload, contamination, lubrication, thrust failures, and Brinelling.

The basic text is the company's newly published manual, "How to Prevent Ball Bearing Failures." The high points follow.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.*

CAUSE

Overload on the Bearing—Premature failure can result when a bearing is loaded beyond its normal capacity radially or axially.. Other reasons: 1. If a bearing with insufficient internal clearance (the space between balls and races) is mounted on a shaft with an excessively heavy press fit, it will operate with increased friction and torque. 2. If the bearing housing is out of round, the outer ring will tend to conform to the shape of the housing. Localized pressure will be exerted on the ball contact area in addition to the normal pressure from the operating workload.

PREVENTION

Several alternatives are open: 1. Redesign using a larger capacity bearing. 2. Decrease the load to lengthen life. 3. Provide housings with proper symmetry and size to eliminate pinching or squeezing of the outer bearing ring. 4. Make sure shafts don't overexpand the inner ring.

Dirty, Damp Surroundings—Contamination, the cause of most failures, says Fafnir, offers bearing users a chance to save thousands of dollars a year. The method: Taking precautions against the entrance of dirt into bearings. Internal clearance in precision bearings is measured in 10 thousandths of an inch. As a result, bearings are susceptible to hard particles of dust or dirt—most of them are larger than 1 thousandth of an inch.

Abrasive Waste Materials—In many applications (including farm implements, industrial grinders, and woodworking tools), abrasive waste products may hamper operation of bearings. Sealed housings or shrouds may be required for protection.

Check cleanliness every step of the way. Watch such things as housings, tools, hands, oils, solvents, rags. Remove all outside dirt from housings before exposing bearings. Keep bearings wrapped in oilproof paper when they are not in use. The Anti-Friction Bearing Manufacturers Association has recommendations for cleanliness.

Housing, Shaft Misalignment—Housing misalignment may be caused by the housings being cocked with the plane of the shaft, or the housing shoulder being ground out of square so that it forces the outer ring to cock in relation to the inner ring. It may also result from settling of the frames or foundations. Shaft misalignment (in relation to the housing) can also cause an overload of the balls.

Shaft Bowing—Shaft bowing can result from such things as improper handling, shaft capacity being exceeded by an overhung load, and inaccurate shaft grinding.

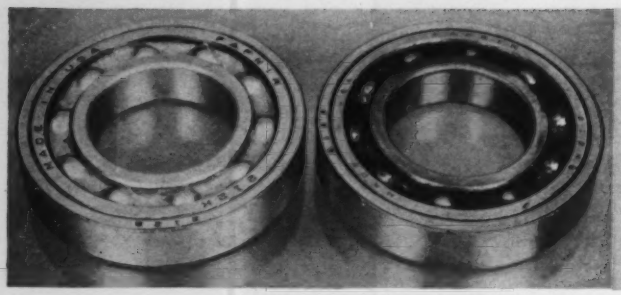
Take a look at both housing bores and true them with each other. The shaft should be gaged for concentricity and straightness. Heavy overhang loads should be lightened or moved closer to the bearing. If shoulders are out of square, they should be reground and gaged so they are perpendicular to both the bearing seat and the shaft center line. Unavoidable misalignment can be corrected with a self-aligning bearing.

(*Please turn to Page 66*)

(*Continued from Page 65*)

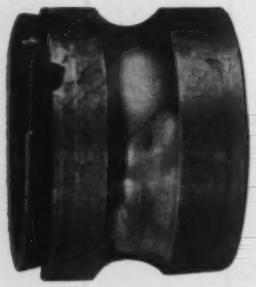
EFFECT

IDENTIFICATION



LUBRICATION FAILURE

Abnormal Temperature Rise—Probably the first sign of lubricant failure is a rapid rise in temperature, accompanied by a whistling noise. The first part to show distress is the retainer. Other signs are stiff, caked lubricant that has carbonized and a brownish or bluish discoloration of the races or balls—indicating that the bearing is no longer operable.



CAM FAILURE

Broken Cam—The eccentric cam on the wide inner ring bearing shows a wedge shaped fracture. Depending on the degree of failure, the fracture may extend into the cam or all the way into the bearing race. The ball path will have a wobbly appearance similar to a misaligned bearing. In operation, the bearing will wobble from side to side. If the housing is flexible enough, the whole assembly may flex with rotation.

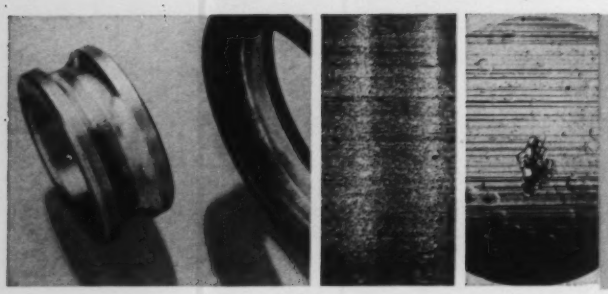
THRUST FAILURES

Counterbored Bearing—A breakdown of the counterbored shoulder may fracture the ring. The balls will be banded from riding up against the shallow shoulder.
Maximum Capacity—In heavy thrust loading, avoid bearings with filling slots. The balls may be nicked.
Internally Self-aligning Bearing— Only one row of balls will carry the load. The other will show almost no wear.

BRINELLING

Mounting Indentations—The tiny indentations appear high on the shoulder of the race. A corresponding indentation occurs on each ball. Sometimes spalling or chipping may result.

Radial Indentations—Indentations appear in the center of the race instead of on the shoulder. They are less common than Brinelling. Reason: Under the sharp impact of radial loads, the rings may fracture before the indentations occur.



ELECTRIC ARCING

Erosion—Each time an electric current is broken between the ball and the race, a pit is produced, followed by fluting. Noise and vibration build up as the fluting gets deeper. Higher amperage intensity, such as a partial short circuit shows up as a rough granular appearance in the ball track. High amperage charges cause cratering in the race (resulting from welding of race to the ball).

CAUSE	PREVENTION
Dirty Lubricants—Contaminants in lubricants act as an abrasive which will lap or polish ball and race surfaces. **Amount of Lubricant:** A common mistake is the tendency to overlubricate. A reservoir full of grease will heat up and deteriorate. Inadequate lubrication will cause overheating also. **Wrong Lubricants**—Check manufacturers' recommendations. For example: Trouble may be caused by mixing two types of grease. Many are incompatible.	Avoid dirty lubricants. Cover containers and keep airborne dust from the lubricant. Use a clean spatula for open bearings. When relubricating, always wipe the fitting and gun nozzle. For standard use, Fafnir recommends greasing the bearing ⅓ to ½ full.
Undersized Shafting—Fafnir's eccentric cam locking collar has tolerance limits for shaft fits on wide inner ring bearings. When the collar is locked to its inner ring mating cam on an undersized shaft, the inner ring becomes cocked on the shaft. The inner ring tries to realign itself with the shaft as it rotates, producing a levering action, with a stress area where the collar grasps the inner ring. Eventually, stress fractures the inner ring cam. **Outer Ring Can't Align**—The outer ring with a self-aligning feature is clamped so firmly into the housing that it can't align.	Where a failure occurs, the shaft should be checked and replaced or plated and ground to size. Check manufacturers' recommended tolerances for shafting. To take advantage of Fafnir's self-aligning feature, make sure the bearing is not too firmly clamped into the housing before alignment has occurred.
Counterbore Failure—A thrust failure is caused either by mounting the bearing backward (so that the load is carried against the shallow shoulder), or by putting a counterbored bearing into a two directional thrust application. **Maximum Capacity Failure**—Maximum capacity failure results from excessive thrust loads. **Internal Self-aligning Failure**—The internal self-aligning bearing will not accommodate heavy thrust loading.	Counterbore failure can be avoided by correct mounting. Make sure the ball has full shoulder support on the inner and outer rings. Suitable bearing types can eliminate maximum capacity or internal self-aligning failure. An external self-aligning bearing helps with thrust.
Force Incorrectly Exerted—Indentations high on the race shoulder are caused in mounting (or dismounting) when force is applied against the unmounted ring. When mounting a bearing on a shaft with a close fit, pushing of the outer ring will exert an excessive thrust load, bringing the balls into sharp contact with the race shoulder and cause a Brinell. **Radial Shock Load**—Radial indentations are caused by a shock load imposed radially on a nonrotating bearing. Typical causes include hitting the bearing with a hammer, or an operating shock load on a static shaft.	In mounting a bearing, force should always be exerted against the ring being mounted. The ring having the tighter fit (usually the ring which will rotate in application) should be pushed. Always apply mounting pressure slowly and evenly.
Static Electricity—Static electricity usually originates with charged belts or from manufacturing processes using calender rolls (leather, rubber, cloth, or paper). The current is carried from the belt to the pulley or sheave, from the sheave to the shaft, through the shaft to the bearing, then to the ground. **Electrical Leakage**—Faulty wiring, inadequate or defective insulation, or loose rotor windings on an electric motor are possible sources of current leakage. Alternating or direct current can damage bearings.	Slip ring shunts can be set up to bypass the bearing. Be sure wiring, insulation, or rotor windings are sound and that connections are properly made. Eliminate static charges, by grounding, or change belting to a less generative material.

Computers Learn English, Then Tell the Machines

• "COMPUTER, tell our horizontal milling machine how to make a set of cams to run job 7776 —the one you figured out yesterday."

That may not be quite how you'll be programing machine tools in a few years, but the concept is a good deal closer than you may think.

"Our technicians believe we will someday program parts merely from a designer's concept of what they should do," says Gen. Orval R. Cook, president, Aerospace Industries Association of America Inc., Washington.

• English language assignments for machines are already in limited use. Goal: Trim time-consuming programing.

IBM's Autopromt system (STEEL, June 19, p. 49) has a 250 word vocabulary that lets the programer specify shapes (such as cone, sphere, and hyperbolic paraboloid) and relationships between surfaces (angle, intersection of, or axis point). The computer then translates the word instructions into codes and calculates the detailed tool travel instructions for each machining region.

General Cook says that the Autopromt and AIA's APT (Automatically Programed Tool) systems are parallel projects. "When the current phase of APT development is completed next December, it will contain all the Autopromt listings. Integration of the two systems is planned as a later part of the AIA program."

General Cook cites three major developments of the APT program:

First, the original 100 word vocabulary fed into the computer to control the machine has been expanded to 250 words. He says: "This allows the computer to speak to the machine tool in complex sentences, rather than simple ones, and results in production of more complex parts."

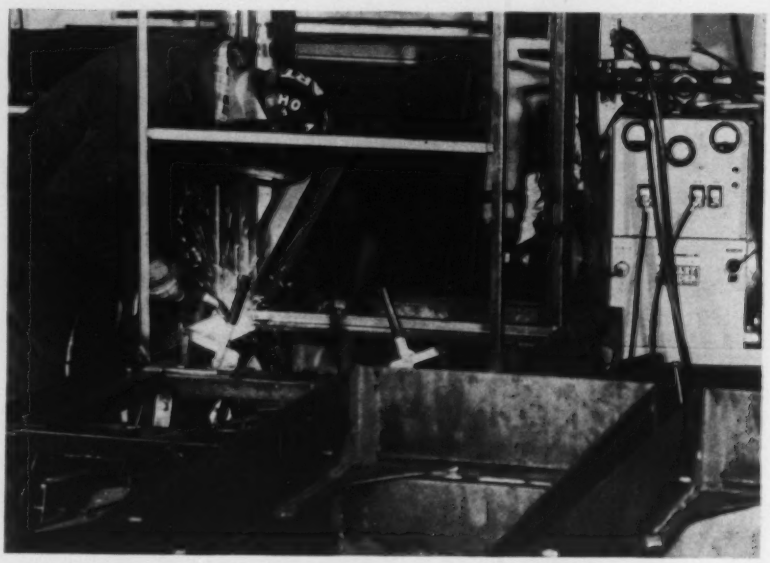
Second, the program language is being rewritten into a universal computer language called Fortan, so that with modifications, it can be used with any type of computer.

Third, a library of generalized procedures has been developed so the part programer no longer needs to repeat involved program procedures each time they are required. He merely refers to the generalized process by name and the computer does the rest.

Coming: A stepup in the system capability from three axis control to full five axis control.

General Cook says: "The great benefit of APT to U. S. industry is its ability to convert a general purpose machine into a special purpose machine. APT will reduce the necessity of acquiring a costly, highly specialized machine for a limited production run. Merely by a change of program, APT will allow utilization of the same general purpose machine for any number of specialized projects."

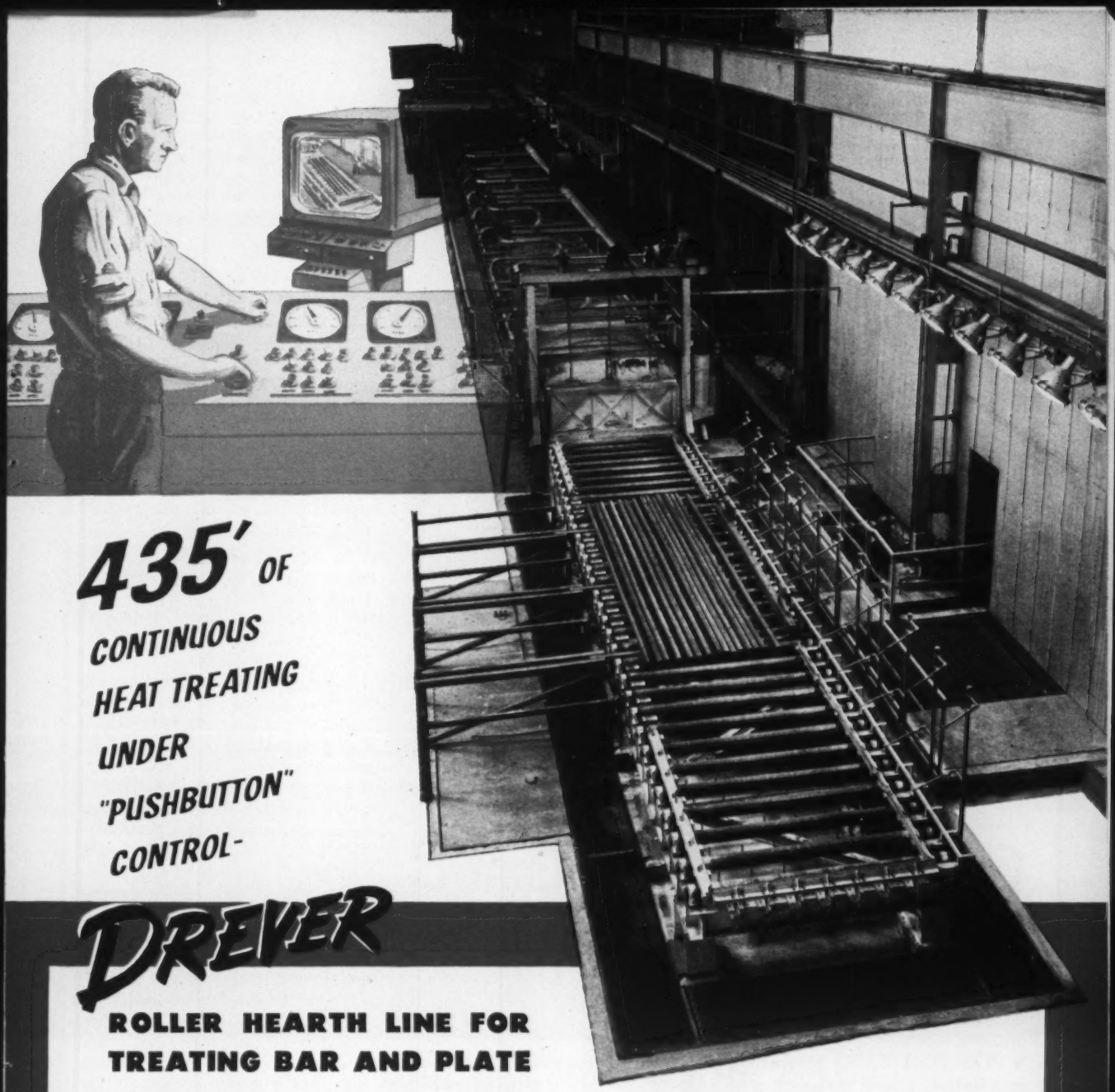
He feels the growth potential is unlimited. "At this point, we are like third or fourth graders trying to formulate problems for a doctor of science. When we are able to pose more complex design problems, digital computers (through the APT system) will be able to solve them."



New Weld Method Speeds Washer Making

FABRICATING frames for large automatic washing machines is six times faster with Micro-Wire welding units than with stick electrodes, says Jenkins Mfg. Co., Fremont, Ohio.

Other advantages listed by the firm: The new unit requires less floor space; slag doesn't need to be removed, a factor which greatly speeds cleaning and reduces rejects. Gas shielding supplies and welding equipment are mounted on a wheeled stand for portability, says the supplier of the Micro-Wire units, Hobart Bros. Co., Troy, Ohio.



435′ OF CONTINUOUS HEAT TREATING UNDER "PUSHBUTTON" CONTROL-

DREVER

ROLLER HEARTH LINE FOR TREATING BAR AND PLATE

The Drever Roller Hearth Line provides the higher output to be expected from continuous production but at the same time adds ease of operation, versatility, and uniformity of quality. Engineered as a complete coordinated unit, it hardens, quenches and tempers twelve 6" dia. x 40′ long bars at a time with maximum production rate of 30,000#/hr. It can also be used to normalize carbon steel plate up to 72" wide x 40′ long at a rate of 19,000#/hr.—or heat alloy steel plate to 1650°F with controlled cooling to 1300°F at a maximum rate of 9,500#/hr.

The entire operation from charge to discharge is directed from an air conditioned booth which utilizes television monitoring and radio intercommunication from booth to floor.

The rolls of each unit have separate drives—maximum line speed is 200 fpm, variable to a low of 0.3 fpm in the tempering furnace.

Like all Drever Heat Treating Units, the Roller Hearth Lines are engineered to be an important part of the modernization of metals production processes—and are the result of specialization since 1939. Write or phone us about your heat treating requirements.

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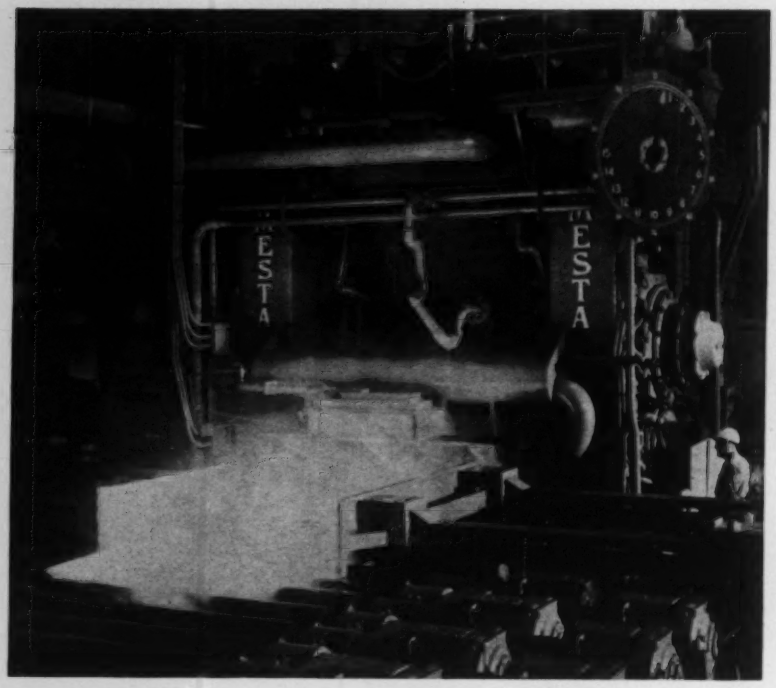
ENGINEERING AND MANUFACTURING FACILITIES AROUND THE WORLD THROUGH ASSOCIATES IN FRANCE, GREAT BRITAIN, GERMANY, ITALY, JAPAN AND INDIA



Quick shift from skelp and strip ups plate output . . .

Computer and Card Control Integrated in Plate Mill

• PUNCHED CARD programing and in-line, process computer control are combined in the operation of a 134 in., reversing, universal plate mill at the Gulfsteel Works, Gadsden, Ala., of Republic Steel Corp.

Rolling schedules that include up to 15 passes are program controlled by a Westinghouse Prodac system. The digital computer equipment, designed for industrial application, was supplied by the System Control Dept., Buffalo, of Westinghouse Electric Corp.

• Operation of the mill is gradually being put under automatic control.

Part of the mill operation is still manually controlled, but the changeover to complete automation continues. Computer and programing equipment has been installed.

The computer monitors roll pressure and thickness measurements from x-ray gages. Then it automatically determines mill settings before each pass. The computer also controls slab elongation in a single pass roughing stand, to govern width of skelp furnished by broadside rolling in the reversing mill.

Information from punched cards is fed into the Prodac system, which directs the positioning of rougher and reversing mill screwdowns, side guides, and edger adjustments. The punched card system also controls mill and table speeds, draft compensation, and rolling cycles.

The operator can assume manual control at any point in the rolling cycle, then return the mill to automatic operation to complete the cycle.

• The mill rolls skelp for pipe, serves as a rougher for the hot strip mill, and also makes commercial plates.

Rolling skelp and roughing slabs for the hot strip mill are the primary uses of the mill, which was designed and built by Mesta Machine Co., Pittsburgh. But it also produces plates for sale as such.

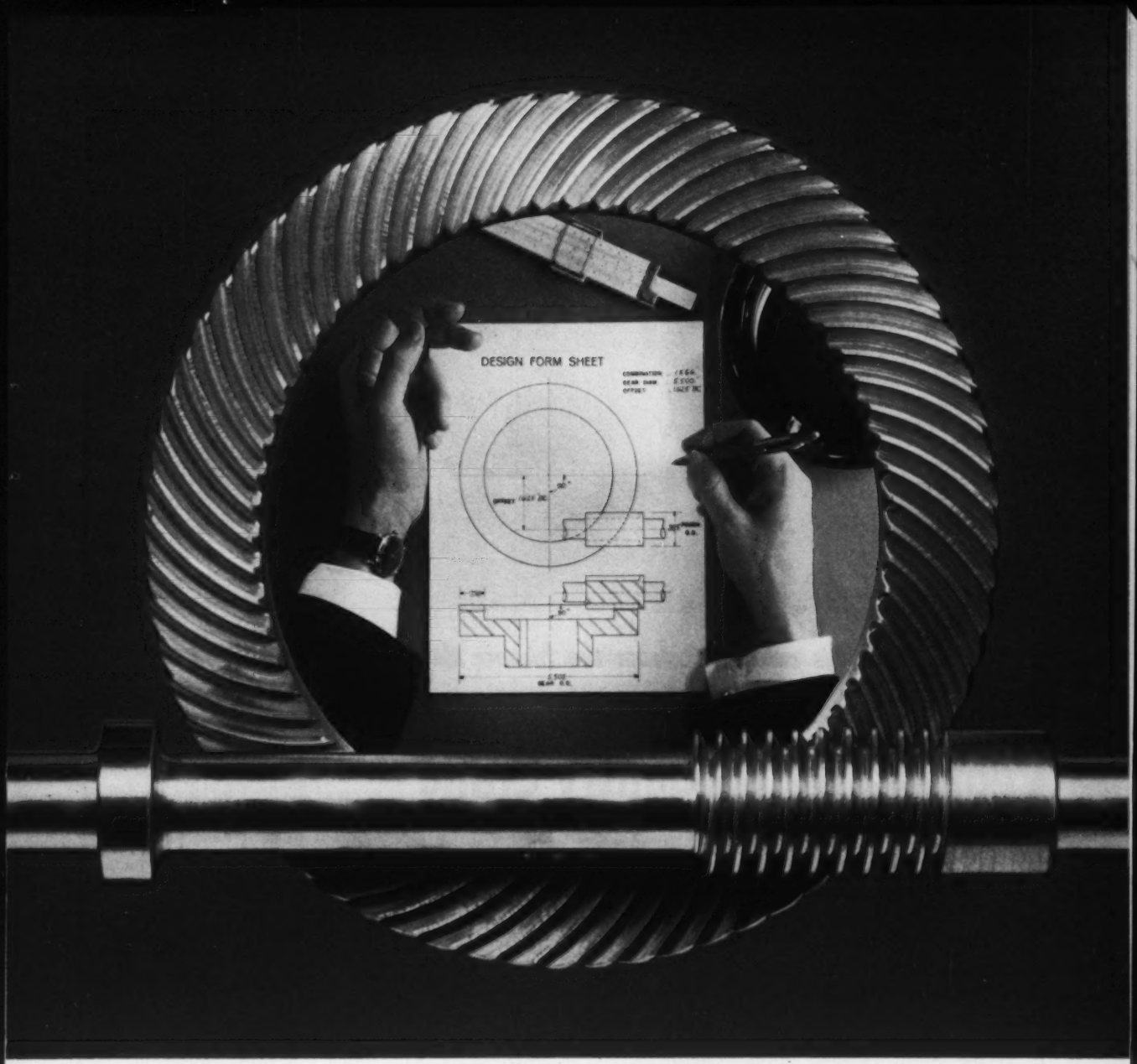
Present processing equipment limits production of sheared plates to 92 in. widths and $\frac{5}{8}$ in. thicknesses. Torch cut plates are produced in widths up to 84 in. and thicknesses up to 2 in. Universal mill plates are made up to 48 in. wide and 2 in. thick.

"The mill adds to our plate capacity, so we can offer plates to the trade on a guaranteed, monthly basis," says Harry Allen, vice president-operations. "It is also important that the mill can be shifted quickly between its two main functions—rolling skelp for pipe and reducing slabs for the hot strip mill. The old plate mill had to be shut down one or two working turns for such a changeover."

• Closer mill control makes for better product quality; wider skelp is available for possible production of larger diameter line pipe.

Material rolled on the mill is said to be flatter, with more uniform gage and a better surface. "The mill makes it possible to produce heavier sheet coils without welds, which helps reduce costs for customers who use automatic processing equipment," says Mr. Allen. "That is an important consideration for the company because of the trend in the South toward increased use of coiled stock."

With its 134 in. width, the mill will allow Republic to increase maximum diameter of line pipe to 36 in.—if future developments make the change practical. But such a change would necessitate extensive modifications in the pipe mill, which is producing pipe 24 to 30 in. in diameter.



Why it will pay to design your high reduction gearing with Gleason HRH*

If you want to make your transmission more quiet or more compact or more flexible, take a good long look at the HRH set shown above.

This single set of gears gives a reduction of 66 to **1.**

The action is quiet and smooth and continuous because the pinion teeth *wrap around* the gear teeth. With this design you can work such quiet operation into your designs even with a one- or two-tooth pinion member.

You can add the rigid support of a straddle mounting, since bearings can be put on both ends of the pinion.

HRH gear ratios are made with proven face mill cutting techniques, assuring complete control of tooth contact pattern to compensate for any assembly or operating condition.

HRH gear ratios are designed with the *full* assistance of all Gleason engineering services. We work with you on the practical design aspects and carry through to the development of prototypes. Then we furnish both machines and tooling for full production—*without royalties.*

Find out what HRH gearing can do for your transmissions. Send for our design form sheet and then send us the gear ratios and sizes you want. We'll send back detailed recommendations promptly.

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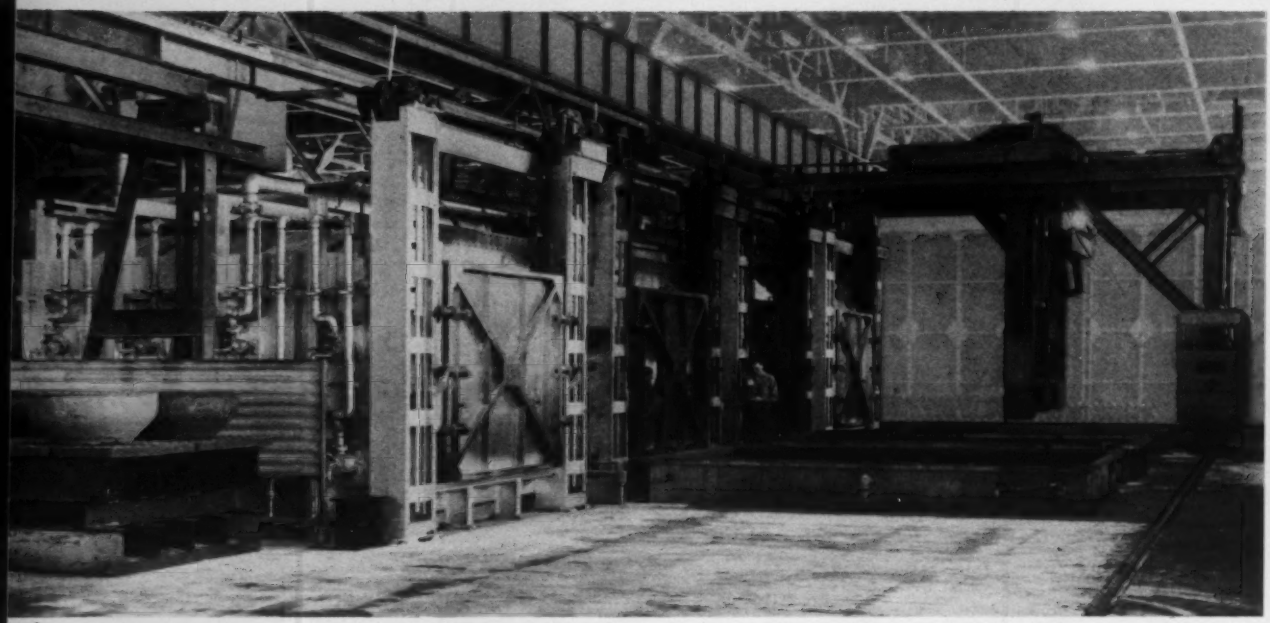


From his cab 30 ft from the furnace doors, the crane operator . . .

Remote Control Gantry Crane Handles Heat Treating Loads

• **BOX TYPE FURNACES are doing a job usually reserved for car bottom units in handling large forgings for heat treatment to 2000° F, at the North Grafton, Mass., plant of Wyman-Gordon Co. The reason: A special gantry crane takes the work through the hardening, quenching, and tempering steps smoothly and rapidly.**

The equipment, designed and installed by Surface Combustion Div., Toledo, Ohio, of Midland-Ross Corp., takes little floor space. A. H. Swift, director of plant engineering, and W. Dewey, plant maintenance engineer for the "offlimits" plant operated for the U. S. Air Force by Wyman-Gordon, report reduced damage in handling the high quality forgings, and add that the heat treating line can be easily expanded.

Four furnaces and two quench tanks are served by the one crane.

• **The crane arrangement makes it possible to place the quench tanks in front of the furnaces. Total space required for the installation: 85 by 50 ft.**

The installation includes two hardening furnaces, two tempering units, an oil and a water quench tank. The hardening furnaces have these working dimensions: 9½ ft wide, 12 ft long, and 40 in. high. Two rows of tunnel mixing burners, one on each side, fire parallel to the furnace arch. Staggering the burners sets up a forced circulation in the furnace and aids in maintaining temperature uniformity.

Tempering furnaces are of the same working size as the hardening units. They are heated by excess air burners. Circulation is provided by a fan at the rear of the unit. Automatic safety control devices are also at the rear—for ease of access.

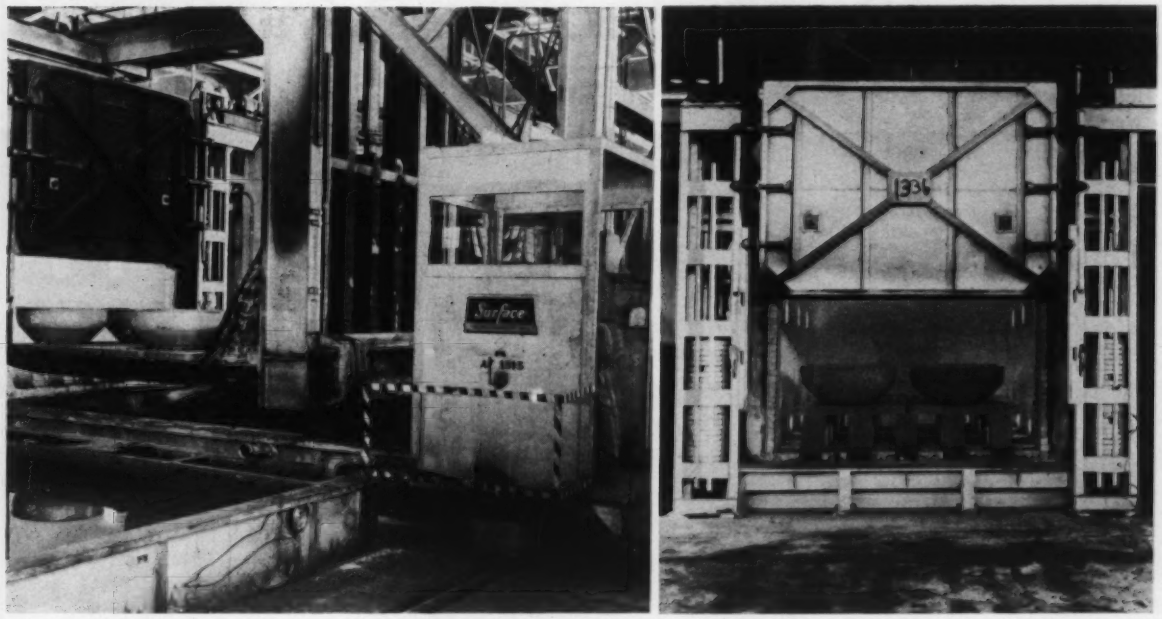
Temperature ranges of the furnaces are 600 to 1600° F for the tempering equipment and a maximum of 2000° F for the hardening furnaces. A tempering furnace is adjacent to each hardening unit.

Quenching tanks each have a capacity of 18,000 gallons. Water in one of the tanks is circulated through a heat exchanger for cooling to maintain the proper temperature. The circulation pattern also provides the turbulence desired for uniform quenching. Oil in the other quench tank is also passed through a heat exchanger. This unit will heat as well as cool; cooling may be needed to extract the heat from the work without exceeding safe quenching temperatures, but oil that is too cold will not quench properly, so that heating may precede the initial quenching. The oil is continuously filtered to remove extraneous materials.

• **Two rails, at different levels, carry the crane system.**

One rail runs horizontally over the tops of the four furnaces. The other rail is parallel to the first but is positioned on the floor of the shop about 30 ft in front of the furnace doors; the quench tanks lie between the floor rail and the furnaces.

A six pronged fork which travels



. . . loads parts into the furnace, where they rest on piers. The . . .

back and forth on the gantry supports the load. The forks carry the work into the quench as well as loading and unloading the furnaces.

An operator cab is attached to the vertical beam of the gantry, rides directly over the floor rail and moves back and forth with the crane's main structure. The operator is always 30 ft away from the furnace doors, so he is protected by distance as well as the cab. Remote controls to operate the doors of the furnaces, control the fork movements, and regulate the crane travel are in the cab.

• Crane forks interleave with furnace piers.

Each furnace has five rows of brick piers, capped with 35-15 alloy plates for wear resistance. The piers extend from the front to the back of the furnace. Fork prongs of the crane fit between these piers; as the crane comes in with a furnace charge and the forks are lowered, the load is deposited on the pier supports. The forks retract below the pier level.

With the forks withdrawn, the operator closes the furnace door from the cab. He can then move to the next furnace to remove a load, return to the end of the line to pick up a new charge, or quench a load from the alternate heating furnace.

At each end of the furnace line, a series of steel I-beams is arranged in a manner similar to that of the furnace piers. They are used for handling work in process and for slow cooling.

For quenching, which is also under the control of the operator in the crane cab, the load on the crane forks is lowered into the proper quench tank. Quenching can be done in 40 seconds.

• Crane can handle 6 ton loads.

The large size of the forgings made in the North Grafton plant necessitates heavy handling equipment. Yet rapid movement is important, particularly into the quench, if maximum properties are to be developed. The crane system will handle 12,000 lb loads speedily, but it can be controlled so that damage does not occur to the parts while they are hot—and softer than at room temperature.

Faster handling also reduces the time that the furnaces are empty, which means that more work can be put through the equipment in a given time. Messrs. Swift and Dewey comment that the heated work is the only hot material removed from the furnace.

• Equipment is also used for smaller parts.

Work processed ranges from single parts that take up the entire furnace working area to pieces only a few ounces in weight. Small parts may be grouped in alloy baskets for handling. Where flatness is a prime requirement, work may be supported on alloy grids.

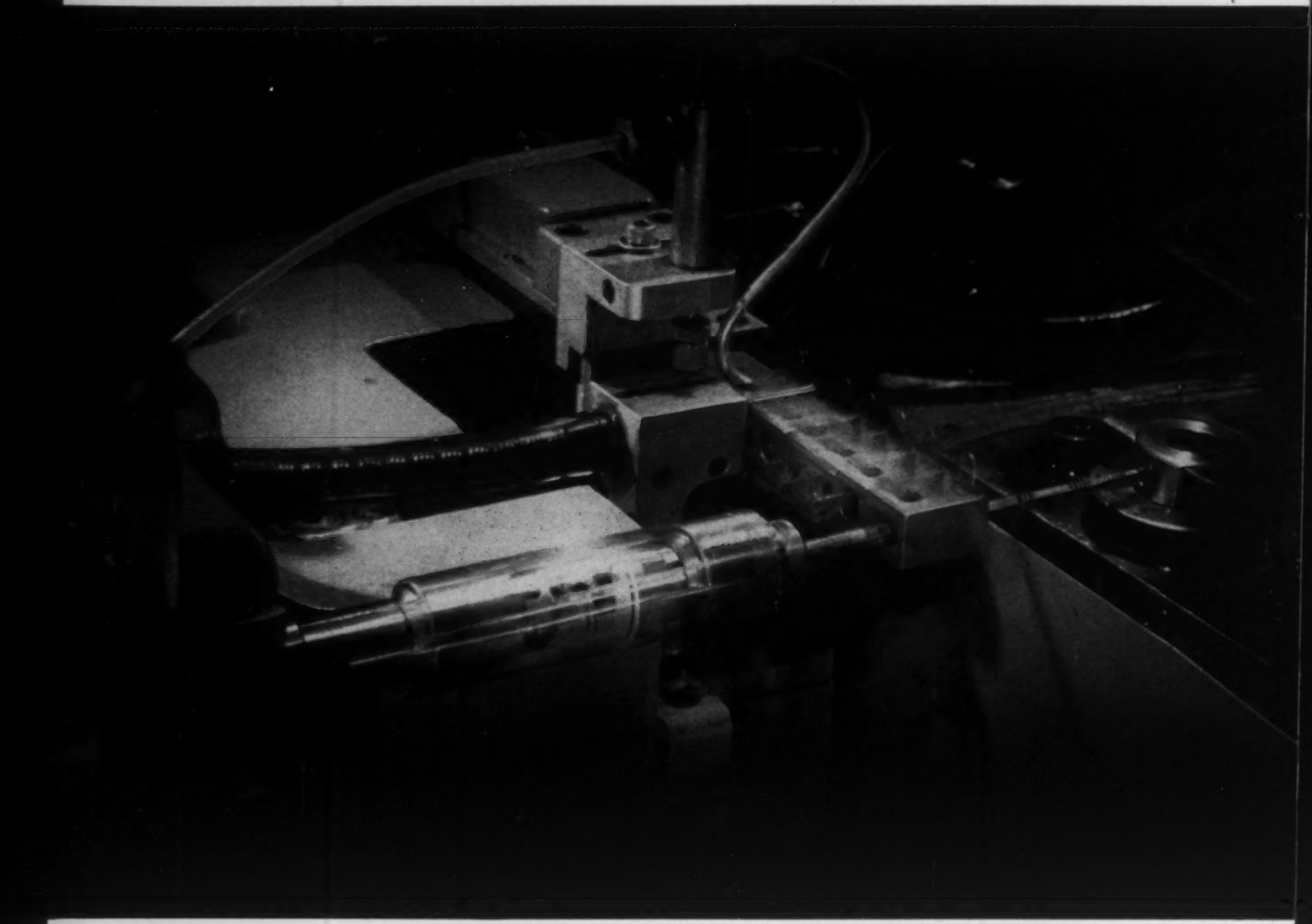
• Furnace installation is part of the U. S. Air Force heavy press program.

Started in 1946 with one closed die forging press of 18,000 ton capacity, the plant now houses seven other presses ranging from 660 to 50,000 tons.

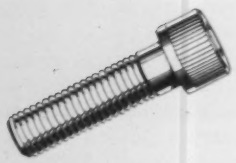
Other portions of the plant, a completely integrated facility, take care of tooling, die sinking, and auxiliary services.

Three men operate the furnace line. One operator manages the gantry unit; a clerk checks the work specifications, temperature controls, and cycles; and a lift truck operator loads and unloads the crane and moves other materials needed in the department.

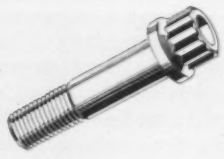
SPS engineering automates



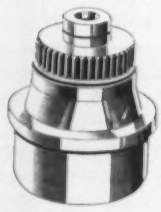
Stop-motion photograph of SPS automated Set Screw Driver. Standard UNBRAKO *Set Screws are made to such close tolerances that they are ideal for use in all high speed automated assembly operations.*



INDUSTRIAL FASTENERS like this UNBRAKO Socket Head Cap Screw are produced to a dynamic reliability standard as a result of SPS research. The SPS line includes a limitless variety of self-locking screws, locknuts and precision fasteners for everything from massive machinery to the most minute products.



AIRCRAFT/MISSILE FASTENERS like this bolt are produced to ultra-high performance standards at SPS. Today's lightest, strongest fasteners in standard and special designs are products of SPS. Research and development work includes titanium, beryllium and other lightweight, high-strength exotic metals.



NUCLEAR COMPONENTS like this cap for a core housing are held to almost unbelievable dimensional tolerances. The nuclear energy field depends on SPS for threaded fasteners, control rod drive mechanisms, motor tubes, core components, instrumentation housings and many other essential parts.

the humble socket set screw

Why would a fastener manufacturer invent an automated machine for customers?

Simple logic—UNBRAKO Set Screws are "automation quality", but until recently lacked an automatic driving mechanism capable of taking full advantage of that quality.

SPS engineers developed the Setomatic® automated set screw driver with remarkable results. Customers now install 2,500 UNBRAKO set screws per hour . . . compared to 335 by hand and 650 by power tools. Costs are down from about $.99 to $.15 per hundred. Quality is higher and more uniform.

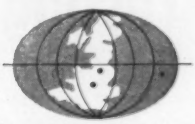
Amazing as the machine is, the real story for fastener users is how the Setomatic is daily proving the superior quality, improved design and cleanliness of UNBRAKO High Torque socket set screws.

Automated or hand-driven, your own applications can benefit from the extra reliability built into UNBRAKO set screws. Precision ground stock, rolled threads. Close tolerance socket depth and outside diameter.

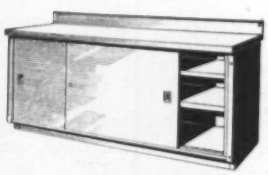
Reliability like this comes first at SPS. Write for literature on the Setomatic and how it automated the set screw.

sps

where reliability replaces probability



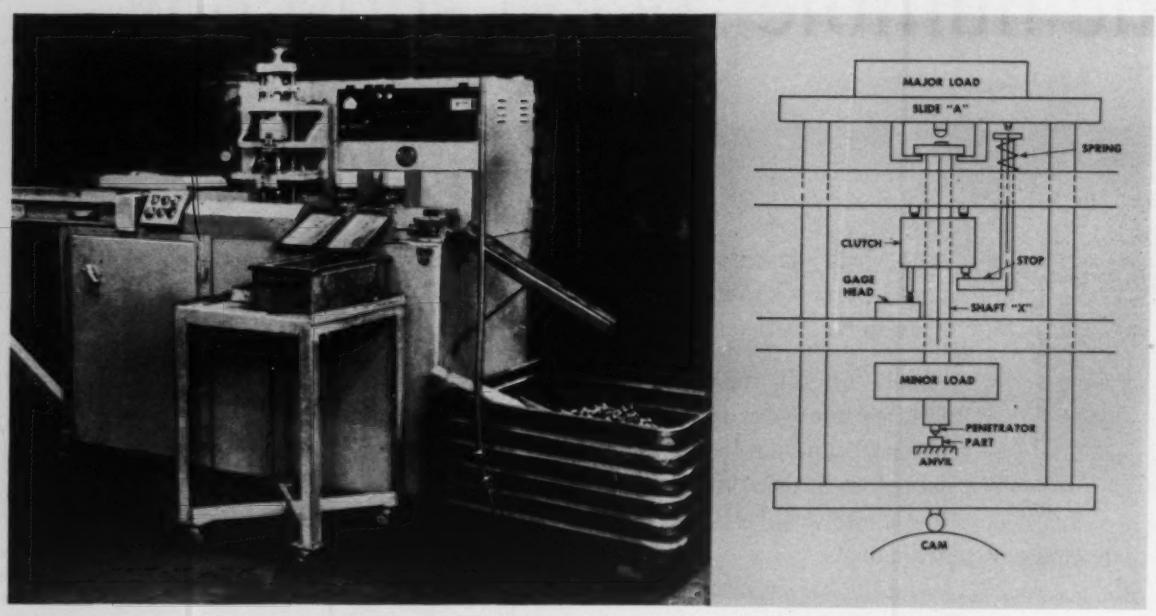
STANDARD PRESSED STEEL CO., Jenkintown, Pa., Santa Ana, Calif. • The Cleveland Cap Screw Company, Cleveland, O. • Columbia Steel Equipment Div., Fort Washington, Pa. • International Electronic Industries, Inc., Nashville, Tenn. • National Machine Products Div., Utica, Mich. • Standco Canada, Ltd., Toronto, Canada • Unbrako Socket Screw Co., Ltd., Coventry and Unbrako Steel Co., Limited, Sheffield, England • Unbrako Schrauben G.m.b.H., Dusseldorf and Koblenz, W. Germany.



SHOP EQUIPMENT for industry and schools is made to the same superior quality standards as other SPS products. The Hallowell line offers broad coverage of standard and special needs in work benches, shelving, and similar equipment. Ruggedness and space efficiency are well identified with Hallowell.

OFFICE FURNITURE like this handsome Columbia Nine-to-Five unit sets an office apart with distinctive styling and color combinations. The complete line includes efficiently designed, durable steel office furniture, plus special units, a wide choice of smart chairs, filing cabinets and accessories.

CAPACITORS FOR ELECTRONICS bearing the IEI trademark are widely used for subminiature circuitry and transistorized applications. This SPS company makes both aluminum and tantalum capacitors, including the lightest and smallest per given capacitance in the industry, to the highest quality standards.



This unit accepts valve lifter, checks hardness, accepts, or rejects, or accepts and sorts into hardness grades automatically. Rate: Up to 3000 parts an hour

Automatic Unit Speeds Hardness Testing Rate

• **AUTOMATIC hardness testing has increased the inspection rate of engine valve lifters several times for Johnson Products Inc., Muskegon, Mich.**

The firm has two machines. (Saginaw Div., Saginaw, Mich., Eaton Mfg. Co., has five.) Accuracy of plus or minus 2 hardness points (at around Rockwell C 55) is confirmed by both companies. Testing was previously done on a bench instrument. The automatic machines are made by Industrial Electronic Products, Detroit, Radio Corp. of America.

Other advantages listed by RCA: Quality is improved; the machines can handle a wide variety of parts —from rough forgings to machined pieces; with suitable accessories, the machine can separate good parts into several acceptable categories by degrees.

Automatic equipment is especially helpful in eliminating defective or out-of-specification pieces which can have a major influence on safety or the expense of repairing machinery, says RCA. (Replacement of a valve lifter requires complete disassembly of an engine.)

• **The automatic machines will handle 2500 to 3000 pieces an hour. They can be hand or hopper fed. Here is how it operates.**

When a part is placed on the anvil (see drawing above), the cam turns, permitting slide "A" to lower the minor load on the part. As the slide continues to move downward, it contacts the stop, permitting the clutch to engage the shaft "X" and the gage head while the major load is being applied. The amount of penetration is measured by the gage (as in the Rockwell system, depth of penetration is a measure of hardness). As the cam completes its turn, it returns the mechanism for the starting point for the next part.

The signal from the electrostatic gage is fed directly to instruments which are calibrated in hardness points. Ordinarily, amplification is not required, claims RCA, unless you want close discrimination between degrees of hardness.

The gage head consists of two thin steel plates which are insulated and separated from each other by a carefully calibrated air gap. One plate is fixed; the other, called the reed, is moved by a small stylus or tip which extends through the case. The entire assembly is a variable air dielectric condenser—the case shields the instrument from outside electrical interference. When attached to the instrumentation, a full scale deflection of the gage head produces a change of 20 volts in the electrical circuit—a value that doesn't ordinarily require amplification, states RCA.

To calibrate the instrument, a part of known hardness is placed on the anvil, and a mechanical vernier positions the gage head on the machine. The stylus must be deflected enough to make the instruments register correctly.

RCA says the cost of the testers varies considerably with each application. Most installations have run $10,000 to $30,000.

Electrostatic Painting Nearly Doubles Production

• **ELECTROSTATIC painting nearly doubled the production of lawn rakes at Keller Mfg. Co. Inc., St. Louis. Paint mileage jumped 153 per cent.**

Daily savings in finishing costs are estimated at $50.

The company is turning out 426 rakes per gallon of mix compared with 168 previously. Painting electrostatically on a conveyorized line with hand guns made by Ransburg Electro-Coating Corp., Indianapolis, eliminated bottlenecks. Now only one shift instead of two is required during the company's January-to-May rush season.

• **With the wraparound feature of the technique, the coating is uniform over all areas—especially important on the tine edges.**

Complete coverage (difficult to obtain by previous methods, says Keller) is important because the tools deterioriate rapidly from rust when exposed.

For painting, the rakes are hung four and five (alternately) to a fixture that moves at 4½ fpm on an 118 ft overhead conveyor. Halfway through the painting area, the work is indexed 90 degrees and the operator hits the areas not completely coated by the wraparound.

After painting, the work moves along into an electric, infrared oven for 5 minutes of baking at 400° F. The rakes can then be packaged for shipping.

Test Finds Hydrogen Content in Aluminum

SMALL bubbles of gas emerging from a cup of molten aluminum in vacuum yield reliable information about hydrogen content, a critical factor in the production of quality castings, claim D. J. Neil and A. C. Burr, research engineers, Aluminium Ltd., Montreal, Que.

The new test promises important economies for aluminum producers, especially in the production of critical aircraft and missile components.

Uniform spacing is maintained, and . . .

Pipe Processing Is Speeded By Magnetic Roll System

• **MAGNETIC rolls make it possible to put a rust preventive coating on welded steel pipe at 200 to 400 ft a minute at the Aliquippa (Pa.) Works of Jones & Laughlin Steel Corp. Production was limited to 100 ft a minute before the rolls were installed. The major difference: It's now possible to feed (and keep separate) two or three sections at a time.**

Four sets of the rolls, which were developed by Eriez Mfg. Co., Erie, Pa., and Aetna-Standard Div., Blaw-Knox Co., Pittsburgh, position and feed the pipe into a centrifugal oiler.

• **Even spacing between pipe sections is maintained by magnetic fields.**

The rolls induce like magnetic fields in two, 1½ in. pipes on the charging side of the oiler, above the rolls. The stationary pipe sections form a magnetic path to guide moving sections into the oiler. When two or more sections are fed into the unit at once, magnetic action causes the pieces to repel each other and remain evenly spaced. That makes it possible for coating to be applied to the entire outer surface of each pipe.

Multiple feeding wouldn't be practical without the magnetic field, says Eriez. Pieces would be unevenly spaced, and uncoated areas would appear where the sections touched during the coating operation.

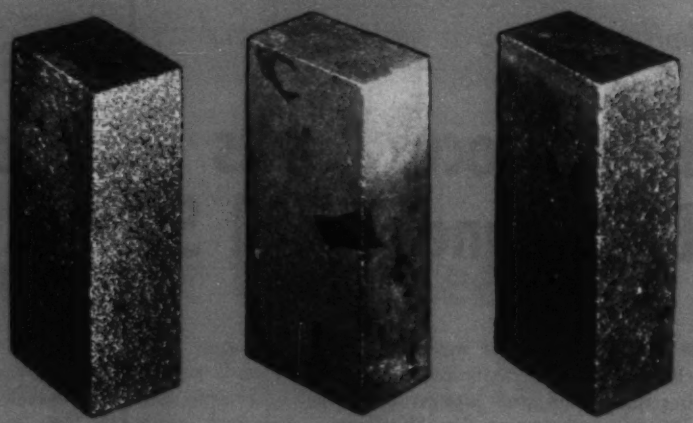
Before the magnetic equipment was installed, V-type feed rolls were used. Production was limited by single feeding and slipping of pipe sections in the roll grooves.

• **Pipe is fed through the coating system automatically.**

Sections of pipe 21 ft long are dropped automatically from a feed table onto the magnetic rolls, which are driven by electric motors. Three of the rolls, on the charging side of each coating unit, carry the pipe into the oiler. Another roll, on the delivery side, carries coated sections to the drying rack.

The roll units can be adjusted to feed one, two, or three sections at a time, depending on pipe diameter. Maximum capacity: Three pieces of ½ or ¾ in. pipe, or two pieces of 1 in. pipe.

INCREASED RESISTANCE TO SPALLING



VEGA HP STAR DASH CONVENTIONAL SILICA BRICK

Heated at rates which break up conventional silica brick, VEGA HP and STAR DASH show no evidence of cracking or spalling.

DEMONSTRATED BY HARBISON-WALKER SILICA REFRACTORIES

The results of these tests indicate a most important advance in the properties of silica refractories. Here are two examples of actual performance.

VEGA HP In one open hearth shop, average roof life was increased from 100 to 250 heats by using VEGA HP. The optimum combination of highest refractoriness and spalling resistance resulted in maximum service life.

STAR DASH In a steel foundry electric furnace roof, STAR DASH was used in a lining that lasted 152 heats compared with a previous average roof life of from 75 to 100 heats. This increase in service life is attributed to improved spalling resistance.

The high spalling resistance of these specialized brands suggests other uses—such as in glass plants, tunnel kilns, copper anode furnaces, acid-operated iron cupolas, carbon baking furnaces, heating furnace roofs, and soaking pits. Write for details.

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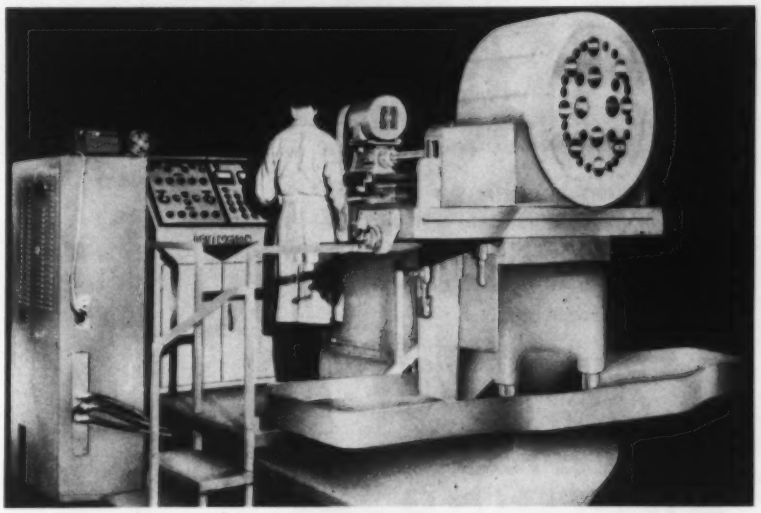
HW-61-4

Gun Unit Uses 3 in. Drills, Has 60 in. Stroke

A TAPE controlled, gun drilling machine, the Electra II, has a 60 in. stroke and a drill diameter capacity of 3 in. in mild steel. The manufacturer says the unit is designed to machine superprecision, deep holes in metals when conventional methods would be too time consuming or impossible.

Precision finished holes that would normally require as many as eight operations on conventional equipment can be drilled in one pass from the solid, adds the company. Tape control is available with a two or three axis movement.

For further information, *write* Drillmation Co. Inc., Center Line, Mich.



Portable Balancer Checks Vibration Problems

A TRANSISTORIZED, portable balancer introduced by Gisholt features building block design and selector switch operation to provide direct, usable answers for vibration and balancing problems in rotating members of many types of assemblies.

Small size and light weight make the unit ideal for on-location use in preventive maintenance programs. Four amplifier and control unit combinations are offered. The most universal unit (shown) houses three meters (angle-amount-tachometer), a filter control, left and right plane separation networks and controls, an angle phasing switch, and a selector switch.

The unit shown can be used for all types of single and two plane operations, including static (single plane) balancing with a check for moment (dynamic) balance.

Vibration amplitude at pickup location can be indicated, or by switching, the exact amount of unbalance can be shown in terms of the correction method used. Exact

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June 9, 1961

NEW PRODUCTS and equipment

angles can be shown in one or two planes of correction, as required.

Each of the four units contains a filter which helps insure that either the unbalance or the vibration indications are shown on meters with minimum influence from other vibrations at frequencies other than the rotational frequency of the work being tested. Five filter arrangements permit units to cover various operating speed increments within an over-all range of 300 to 150,000 cpm. Vibration amplitudes as small as 0.000025 in. can be measured, located, and corrected. Available accessories include driven type pickups, inertia type pickups, a stroboscopic lamp assembly, a photocell pickup and light assembly, and a proximity pickup assembly.

For further information, *write* Gisholt Machine Co., Madison 10, Wis.

Automatic Machine Makes 1500 Cuts Per Hour

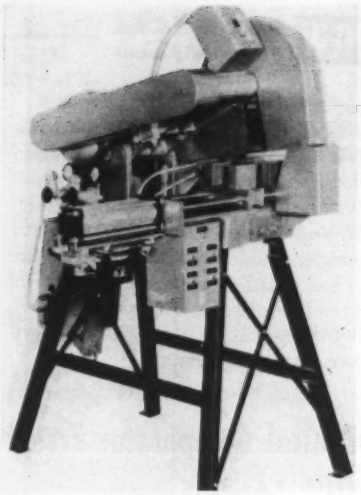
TUBING, extruded shapes, and bars (ferrous or nonferrous) can be cut to desired lengths automatically on the Beaver No. 14, abrasive cutoff machine. Speed: 1500 cuts an hour.

The manufacturer says that most shapes up to 3 in., standard bar lengths, and 1¼ in. soild stock can be cut with 3/16 to 8 in. feed strokes. Longer feed strokes can be produced with special adaptations.

The unit has a specially designed air vise that holds most shapes within the feed range. The machine can be set for semiautomatic or automatic cycle cutting. Short and long run jobs can be set up and processed easily, says the company. The unit can also be used for maintenance type cutting (the automatic controls do not interfere with single cut operations).

Air pressure control for cutting feed ranges adjusts wheel pressure and prolongs cutting wheel life by 30 per cent, estimates the manufacturer. Head stop adjustments allow the unit to control the headstroke for a minimum of wasted travel time.

The machine is powered by a 5 hp, 3 phase, 60 cycle motor. Wheel



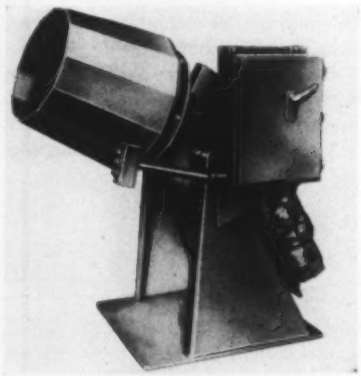
speed is 3000 rpm. Wheel diameter is 14 in.

For further information, *write* Beaver Pipe Tools Inc., Warren, Ohio.

Barrel Finishing Units Handle 815 lb Loads

AUTOMATIC tilting of the barrel from 40 degrees above the horizontal to about 35 degrees below the horizontal is featured on the Electratilt finishing unit.

The tilting is done by a standard gear motor and chain drive. A selector switch controls the direction of tilt and limit switches hold the tilting motion of the barrel at the selected positions. Turning the selector switch button to the neutral position allows tilting to be stopped at any point between extremes.



Another unit, nearly identical, uses a manual hydraulic device for raising and lowering the barrel. It's

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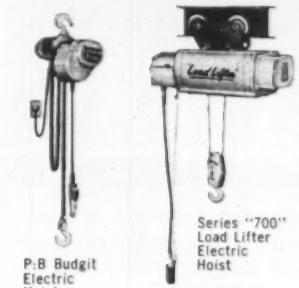
1✓ ELECTRIC HOISTS for frequent lifting with pace setting speed

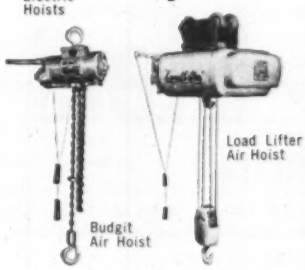
2✓ AIR HOISTS to lift fast where atmosphere conditions are hazardous, corrosive, extremely hot, dirty or wet

3✓ CHAIN BLOCKS for easy lifting where the work cycle is moderate



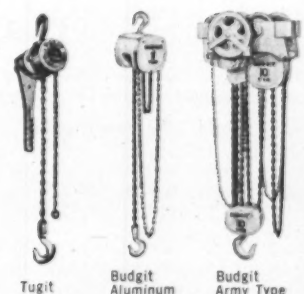
P:B Budgit Electric Hoists

Series "700" Load Lifter Electric Hoist



Budgit Air Hoist

Load Lifter Air Hoist



Tugit

Budgit Aluminum Chain Block

Budgit Army Type Chain Block

ELECTRIC HOISTS

P:B Budgit® Electric Hoists. 1/8 to 2 tons. Modern push-button hoists for regular service. Portable. Two fully enclosed automatic brakes. Spotting action is fast, accurate. 1/2-ton load can be lifted at 34 FPM. Hook suspension. Trolleys available. Standard models for intermittent service — AC, DC, and 12-volt battery types — have pull cord control.

Load Lifter® Electric Hoists. 1/2 to 15 tons. For heavy-duty and production line service. Safe 24-volts at the push button. Single and 2-speed control. A ton can be lifted at 60 FPM. Two automatic brakes. Types for lug or hook suspension; also with push, hand-geared or motor-driven trolley. Hi-hook model increases length of lift.

AIR HOISTS

Budgit® Air Hoists. 1/4, 1/2 and 1 ton. Compact, lightweight hoists for regular lifting service. Link and roller chain types. Explosion proof motor. Spark and corrosion resistant link chain models. Speeds infinitely variable to 75 FPM. Pull cord control. Safety hooks standard. Rigid mount type and push trolley available.

Load Lifter® Air Hoists. 1 to 15 tons. Wire rope type for heavy-duty service. Five cylinder motor for smooth operation at all speeds. Speed infinitely variable to 37 FPM. Pull cord control standard; throttle control available. Mechanical load brake adjusts itself. Lug, push trolley, and hand-geared trolley suspension.

CHAIN BLOCKS

Tugit® . . . the Lever-Operated Hoist. 3/4 to 3 tons. Light. Compact. Portable. Operates easily at any angle even in close quarters. Has countless uses in every industry. Spur-geared for highest efficiency. A 42-lb. pull on the handle lifts 2 tons. Spark and corrosion resistant models.

Budgit® Chain Blocks. 1/4 to 10 tons. For production or maintenance. Combine light, strong aluminum frame with spur-geared lifting and automatic load brake. 25 lb. pull on hand chain lifts 1/4 ton. Hook suspension standard. Trolleys available. Army-type Budgit has integral trolley that can be adjusted to fit several sizes of I-beams and permits high hook lift. Ask about spark and corrosion resistant models.

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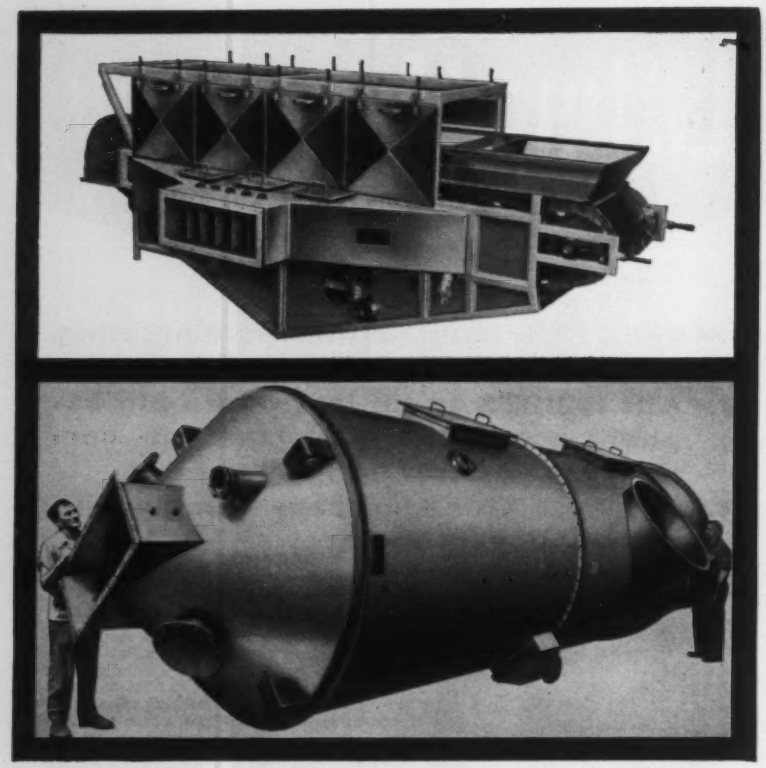

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identified as the Hydratilt model.

Both models can be fitted with a full range of barrels of different sizes, shapes, and materials, including the standard wooden, cast metal, and bottle barrel. Workload capacities range from 500 to 815 lb.

For further information, *write* Barrel Finishing Equipment Div., Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.

Optical Comparator Fitted With 14 in. Screen

PARTS such as lead screws, die bodies, castings, forgings, and large circuit boards can be inspected on the Jones & Lamson optical comparator (Model FC-14ER). Screen size: 14 in.

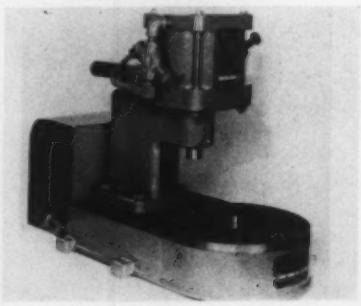
The worktable on the unit is 32 in. long, 8 in. wide, and is supported on two heavy duty columns having ten pitch hardened and ground lead screws. The optical system has lenses that are matched and preset for rated magnification on master optical benches.

For further information, *write* Jones & Lamson Machine Co., Springfield, Vt.

Assembly Press Hurries Small, Precise Work

WITH the Geneva motion, dial assembly press, one operator can frequently double or triple production on small precise assembly operations, says the manufacturer.

It has an 11 in. diameter plate with eight stations and a 1 ton press head with a 2 in. stroke and a 3 in. throat. For bench mounting,



the unit has an electric variable speed drive (18 to 36 indexes per minute).

The company says the machine will also be available with a combination press-stake head, spinning head, and welding head.

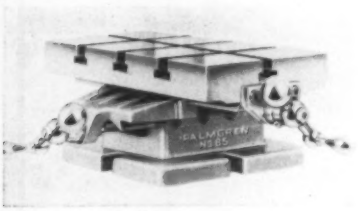
For further information, *write* Precision Detroit Co., 20100 Sherwood Ave., Detroit 34, Mich.

Table Permits Accurate Milling on Drill Presses

ACCURATE milling on drill presses can be done with the No. 85, dual cross slide, milling table. It can be furnished with a 6 x 10 or 6 x 12 in. table top surface. Each size has one longitudinal T-slot and three equally spaced cross slots.

Transverse travel is 4½ in. and longitudinal travel is 6 in. Dials are 1¼ in. in diameter and are graduated in thousandths. Balance cranks are removable. The large square base has four mounting lugs and ⅝ in. keys and keyways for machine slot mounting.

Dovetail slides are equipped with adjustable steel gibs. Acme thread feed screws are furnished with adjustable brass bushing nuts and provide easy travel to suit the operation and material.



The company says the No. 85 table is ideal for milling machines, grinders, as well as laying out work.

For further information, *write* Palmgren Steel Products, 8383 S. Chicago Ave., Chicago 17, Ill.

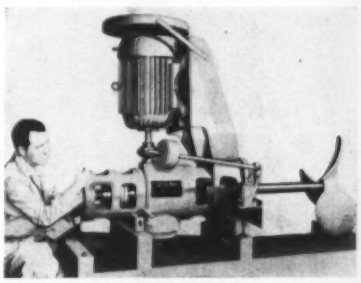
Mixers Feature Greater Blending Capacity

GREATER flow or blending capacity (about 50 per cent more) and a 50 per cent reduction in installation and operating costs are claimed for the Lightnin NSE mixer line.

Three basic sizes are available for applications ranging from 1 to 50 hp. Mixers are right angle, spiral bevel, gear units with hollow quill, speed reducers (developed for side entering applications).

The manufacturer says the new unit makes it possible to eliminate multiple unit installations, pointing out that savings in installation costs can be substantial.

An auxiliary line of side entering mixers (Series RSE) has been developed for installations not requiring the shock load protection afforded by hollow quill construction and independent bearing support (standard in the NSE line).



RSE mixers are made in two basic sizes ranging from 1 to 25 hp. The company sums up advantages for the lines by saying they provide lower equipment and installation cost, lower power requirements, and larger mixing volumes for equivalent horsepower.

For further information, *write* Mixing Equipment Co., 170 Mt. Read Blvd., P. O. Box 1370, Rochester, N. Y.

One Drill Produces Many Hole Diameters

LOWER tool costs, fewer tool changes, and elimination of separate finishing steps in some drilling operations are said to be possible with a cone drill developed by Scully-Jones.

A single drill produces a wide variety of hole diameters in metal, plastic, or any other relatively thin material. In many cases, tool change time and the need for stocking a variety of drill sizes are eliminated. Any hole size from ¼ to 1¼ in. can be drilled.

The company says the unit can eliminate circular hacksawing or

(*Please turn to Page 87*)

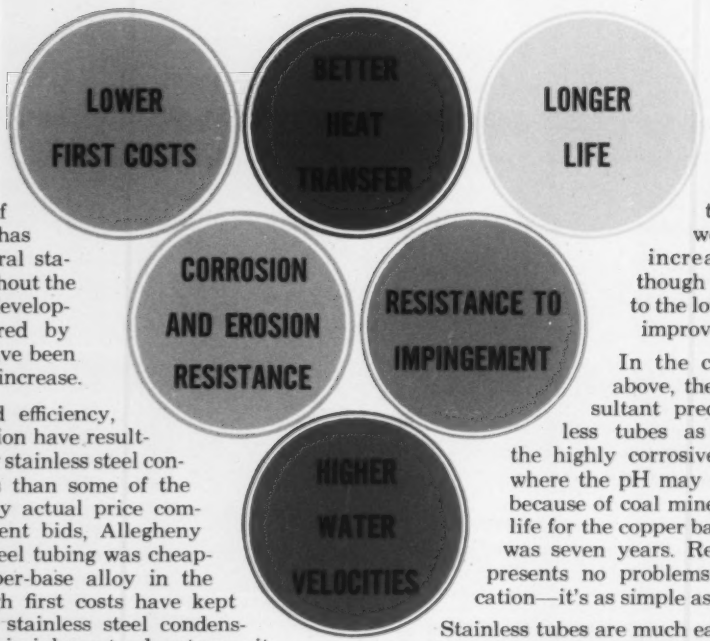
Look Ahead

. . . for an example of Allegheny Stainless at work in a specific market application.

Check the next two pages which also appear in the June issues of POWER, COMBUSTION, and CORROSION.

It's just another case of Allegheny Stainless at work for you . . . in your products . . . in your markets . . . in your merchandising efforts.

NEW DEVELOPMENTS IN ALLEGHENY STAINLESS STEEL CONDENSER TUBES MEAN



In the last three years, over 3 million feet of stainless steel tubing has been installed in central station condensers throughout the United States. New developments, many sponsored by Allegheny Ludlum, have been responsible for this increase.

Automation, improved efficiency, and increased production have resulted in lower prices. Now stainless steel condenser tubes cost less than some of the copper alloy tubes. By actual price comparisons on some recent bids, Allegheny Type 304 Stainless Steel tubing was cheaper than a usual copper-base alloy in the same diameter. If high first costs have kept you from considering stainless steel condenser tubing with all their inherent advantages, it will pay you to re-investigate.

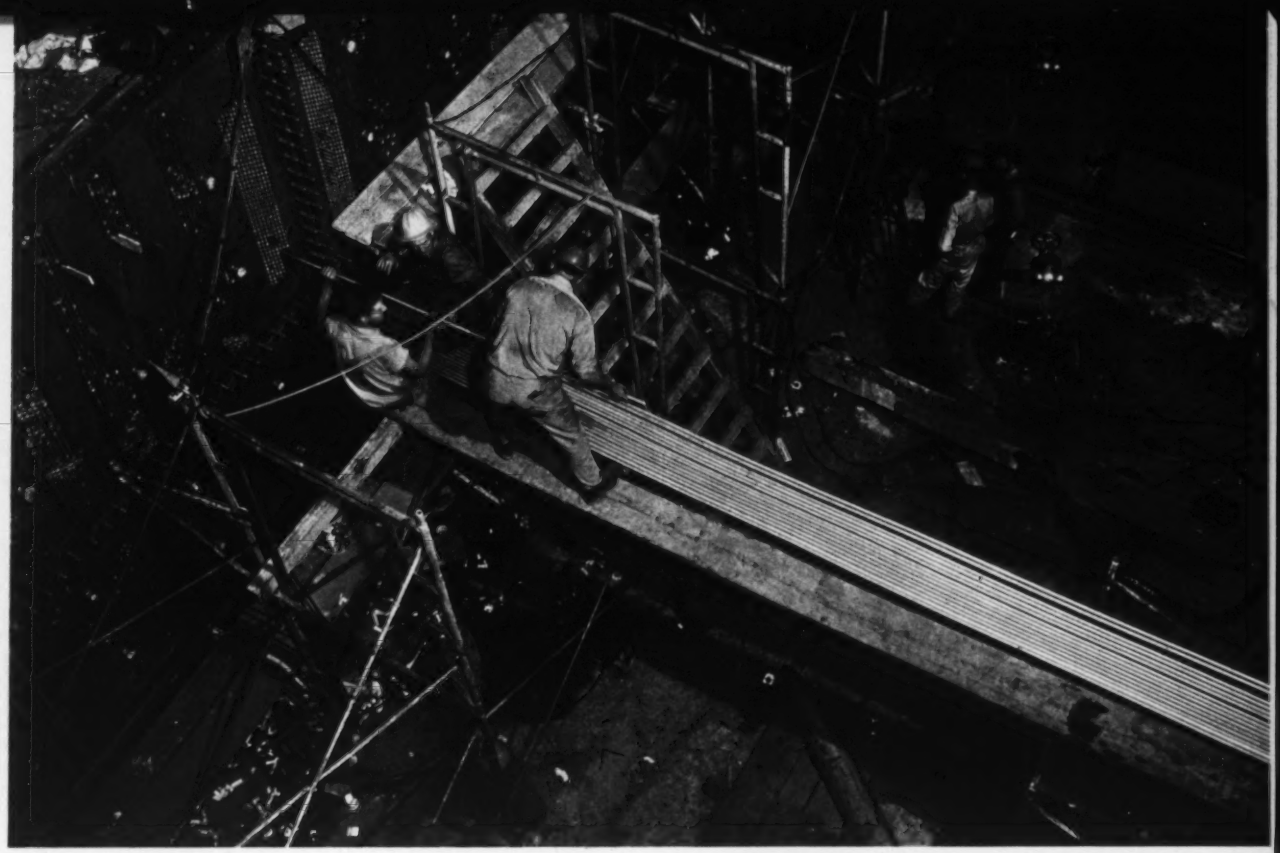
Increased operating data have shown that the in-use heat transfer rates on condenser tubes are much superior to the published data of a decade ago. Exhaustive tests made at a condenser completely re-tubed with Allegheny Type 304 Stainless Steel in May 1958 showed that the actual over-all heat rate on the turbine was improved over the 88-10-2 copper tubes previously used. Part of the answer is the thinner wall possible in the stainless tubing, 22-Bwg, compared with the 16-Bwg copper alloy tubing formerly used.

The superior strength of stainless allowed these thinner walls. In spite of the larger inside diameter, cooling water velocity through the tubes averaged ½ FPS more in stainless, although the pumping facilities were not changed. This increase in velocity, even though the ID is larger, is due to the lower flow resistance and improved interior cleanness.

In the condenser mentioned above, the utility and their consultant predict the life of stainless tubes as thirty years despite the highly corrosive river water involved where the pH may vary from three to six because of coal mine drainage. Previously, life for the copper base tubes formerly used was seven years. Re-tubing with stainless presents no problems, calls for no modification—it's as simple as re-tubing with copper.

Stainless tubes are much easier to clean than copper alloy tubes. They are harder and tougher. The mud and slime do not cling to the surface. With copper tubes, it was impossible to clean these condenser tubes without using oversize cleaning plugs which would have affected tube life. Practical cleanliness of copper tubing averages less than 60%. After re-tubing with Allegheny Stainless, one shot with nylon brushes restored cleanliness to the as-new condition.

Another major trend is the partial use of stainless tubes to resist excessive steam-side erosion. Many condensers are being specified or re-tubed with stainless tubes in the outer banks to resist blasting action or steam impingement. Generally, approximately 5% of the total tubes are specified stainless for the periphery. Even here, 22-Bwg stainless is usual where 18-Bwg or less is necessary in the copper alloys.



Retubing the air removal section of this condenser with Allegheny Stainless Tubes eliminated attack by the high ammonia content of the non-condensibles.

Another trend is the use of stainless in the air cooler or residual condenser section. Copper tubes tend to stress crack and fail because of the ammines used for water purification. Under these conditions, stainless tubes remain unaffected even under excessive build-up of ammonia in the non-condensibles.

On the horizons in heat transfer equipment design is an all stainless steel condenser that will result in an overall size reduction. With the higher strength and the less resistance to water flow of stainless tubes, water velocity through the tubes can be doubled. Erosion and corrosion can be virtually eliminated. Right now, several consulting firms are evaluating this latest development.

Stainless steel condenser tubing is welded from high quality stainless steel strip on automatic machinery. After fabrication, they are cold drawn to increase strength and improve finish. Stainless steel condenser tubes are guaranteed against preferential corrosion attack at the weld. They can be rolled or welded into the tube sheet with the same equipment and procedures as with copper alloys. At the tube sheet, stainless steel resists oxygen release. There are no galvanic problems.

The trend to stainless steel condenser tubes is growing by leaps and bounds. For more facts, details, and general information, contact the nearest Allegheny Ludlum representative or write: ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.***

No deterioration after 17 years of operating tests in river water made highly corrosive by coal mine drainage resulted in the selection of Type 304 Allegheny Stainless for the tubes in this condenser unit.

ALLEGHENY LUDLUM AL®

A-L products: stainless, high-temperature, electrical and tool steels; magnetic materials, and Carmet Carbides

2863

How the choice of a cutting fluid affects your costs

Often—perhaps *too* often—the supplier of cutting fluids for machining or grinding, points to the quality of the work and totally ignores its surprising counterpart—a lower over-all cost of operation.

Many a user of petroleum-base fluid might never notice the oversight. A better fortified coolant, which costs more per gallon, would not seem to reduce the final cost of the work, although it can readily be proven to produce better machined parts.

But it is pertinent to examine more closely the cost factors. The facts may surprise machine shop men who have not fully considered all the items which influence their costs. The measurable, tangible cost factors are these:

- Initial cost
- Cost of mixing
- Production rates
- Tool or wheel life
- Machining cost
- Overhead
- Cost of cleaning
- Life of the fluid
- Cost of rejects
- Reworking costs caused by rust

A comparison of first cost with final cost per piece, made on the basis of long experience with both conventional water-soluble oils and the newer chemically conceived fluids reveals some astonishing figures. Just a quick glimpse:

- The modern fluid costs about four times as much as the old soluble oil.
- But that modern coolant can be cut with three times as much water as the oil-base fluid.
- The modern coolant requires less make-up.
- It lasts over six times as long as the oil emulsion—contains nothing to make it turn rancid.
- It enables faster production—machines can be speeded up.
- It requires less frequent emptying and cleaning of machines.
- The over-all cost of coolant per piece produced has repeatedly proved

to be upwards of *40% less* with a good chemically conceived coolant than with a conventional soluble oil!

There are intangibles, too, which are not as measurable, but which affect both cost and quality. To mention a few: Cleanliness of shop, operator satisfaction, visibility of work, smoke problems, accuracy of work, adaptability to a wide range of jobs, and safety (fire hazard, slipperiness of floors, etc.).

It is illuminating to examine all of these direct and indirect influences a cutting fluid can exert. Little wonder that it is termed the "third leg" of the base on which successful machining depends—the others, of course, being the tooling and efficiency of the machine itself.

Our concern is with the fluid itself, because Houghton has made and supplied many types through the past half-century.

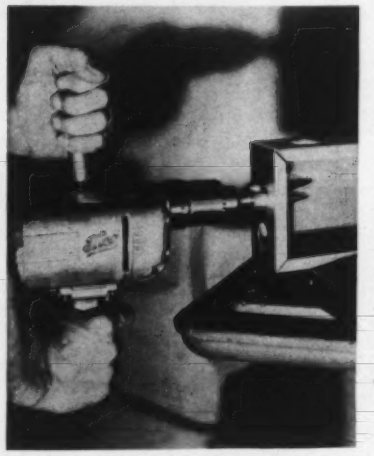
Our recent successes have been with the chemically conceived types of coolants, scientifically fortified to do a double job of improving quality *and* cutting final costs. *Hocut 237* is a perfect example of such a coolant. Data on its applications and availability will gladly be supplied. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

Houghton

INDUSTRY'S PARTNER IN PRODUCTION

NEW PRODUCTS and equipment

(*Continued from Page* 83)



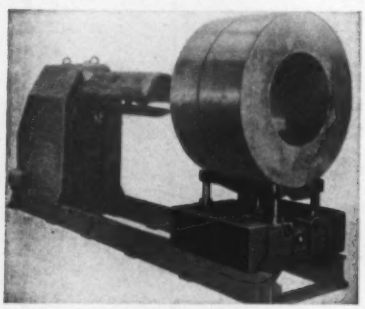
knockout punching in sheet metal work. The drill point is 7/32 in. in diameter. For precise hole sizes, the operator scribes holes of different diameters, then drills accurately to size. The ability to remove a continuous chip and leave no burr inside the hole after drilling eliminates subsequent finishing operations, says the company.

Cone drills can be used in power tools of ½ in. drill capacity, in drill presses, and similar machines. Recommended speed after the hole is started is 500 to 600 rpm. Starting speed can be much higher, says the company.

For further information, *write* Scully-Jones & Co., Chicago, Ill.

Coil Loading Car Saves Time, Prevents Damage

FOR HANDLING large coils of stock, the Littell S-200 coil loading car saves time and prevents damage, says the manufacturer. It's

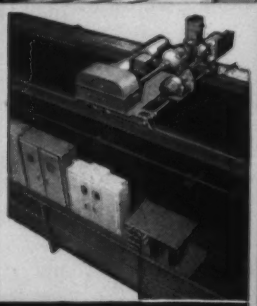


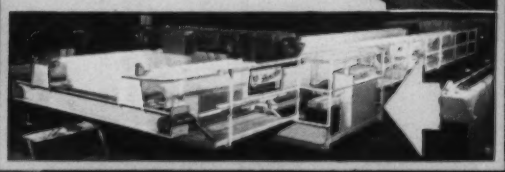
(*Please turn to Page* 90)

TIN
COATING
from .00002
to .0025
Somers
THIN STRIP
For the first time tin coated thin strip is available in solderable coatings up to .0025" thick.
Pure tin and tin-lead alloys are now coated on copper, brass, or nickel in all gauges from .002 to .012 in thicknesses of .00002 to .0025.
Over 50 years experience in the highly specialized field of thin strip makes Somers your #1 source for that one job in ten that must meet rigid specifications. Write for confidential data blank to get the exact thin strip for your requirements — no obligation, of course.
SOMERS BRASS COMPANY, INC. • 94 Baldwin Ave., Waterbury, Conn.

You can

40-ton crane in midwestern heavy-metal processing plant, recently equipped with EC&M STATA Hoist Control





10-ton cranes on erection floors of Whiting Corporation *(right)* and Shaw-Box *(below)* with EC&M STATA Hoist Controllers, mounted and wired

SQUARE D COMPANY

EC&M DIVISION • CLEVELAND 28, OHIO

spot 40 TONS—

—OR CRACK A WALNUT—WITH

EC&M STATA CONTROL

Now it can be done with precision by AC! EC&M STATA Hoist Control gives the finest electrically controlled speed regulation ever attained. Regardless of crane load, the operator can release the brake and hold any load stationary—a big advantage when landing loads, hooking-on, or unhooking. Also, the operator has infinite operating speeds between standstill and full load motor speed for both hoisting and lowering. The EC&M STATA Hoist Control provides these important benefits:

Fast response lets an operator change directions quickly, permits the hook to respond rapidly to master switch movements

No mechanical or electrical load brakes to mount or maintain

Fewer trolley (collector) bars than with any other stepless system

Fail-safe feedback circuitry removes power and sets brake if an open circuit occurs

Overhoisting protection with standard power-type (Youngstown) limit stop—no additional equipment to lower down after limit switch trips

Simplified maintenance—the static components, enclosed in sub-assemblies, are more reliable, more easily understood and provide convenient inspection or test points

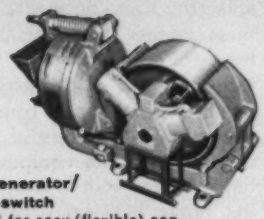
Float control, actuated by a push button in the master switch handle, permits standstill with the brake released; also provides creeping speeds, up or down

Front-connected control panels facilitate mounting, permit rapid testing or inspection. Full motor protection built into each panel

When buying cranes or revamping existing installations, investigate EC&M STATA Control

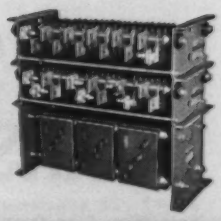
Write **FOR COMPLETE FACTS** • *Ask for Bulletin 6401—Square D Company, EC&M Division, 4500 Lee Road, Cleveland 28, Ohio*

Compact, Coordinated Units for Easy Mounting on Crane Trolleys



Tach-generator/ Speed-switch unitized for easy (flexible) connection to wheel of EC&M WB hoist brake

Power-type (EC&M Youngstown) Safety Limit Stop operates in normal manner to prevent overhoisting. Disconnects power, sets brake—resets automatically when master switch is moved to lower



Resistor-reactor assembly connects to motor slip rings... its fixed values eliminate secondary trolley collectors

wherever electricity is distributed and controlled

5350

NEW PRODUCTS and equipment

(*Continued from Page* 87)

safe and easy to operate.

By keeping a reserve coil next to the reel (ready to use), the S-200 eliminates the production delays that occur when one coil is depleted and a crane (to bring up a new coil) is not immediately available.

The company says the S-200's automatic, electronically controlled operation makes it easy for one man to load a 20,000 lb coil on the reel in minutes. Damage to reel or coil caused by bumping is eliminated.

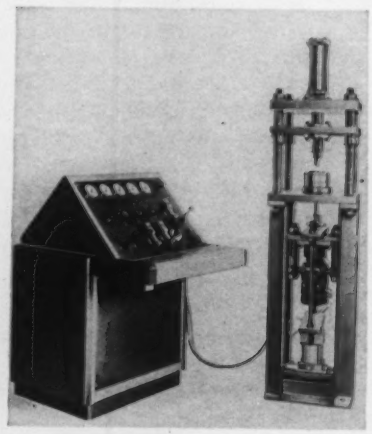
With smooth, hydraulic action, the car raises the coil to proper height, moves it forward and onto the reel's contracted expansion arms, lowers from contact with the mounted coil and moves back to position to receive a new coil.

The 18 in. lift permits loading a partial coil in addition to full coils. To protect the reel, the hydraulic control valve can be set to limit lifting power to 20,000 lb. The closed hydraulic system prevents sudden lowering action even if the car is loaded and power fails.

For further information, *write* Service Dept., F. J. Littell Machine Co., 4101 N. Ravenswood Ave., Chicago 13, Ill.

Process Slashes Costs in Powder Metal Compaction

A PROCESS for the compaction of components from powder metals, ceramics and cermets uses the Vibrajust Shockwave compaction machine. The company says manufacturers can attain far greater preform densities than previously achieved with conventional compression apparatus. In addition, the compaction technique produces considerable savings in total production costs and capital equipment expenditures, the company adds.



A self-contained, Vibrajust, variable impact vibrator is the impact force source. It's capable of delivering ten times the kinetic energy of a conventional vibrator of comparable size, says the maker. Accelerations greater than 20,000 g have been induced in powder specimens to achieve high densifications. Samples have been compacted to more than 90 per cent of theoretical density with the equipment. The impact force source has an operating range between 0 and 500 impacts per minute, with air consumption running as little as 1/50th the equivalent amount of air consumed by a standard vibrator, estimates the maker.

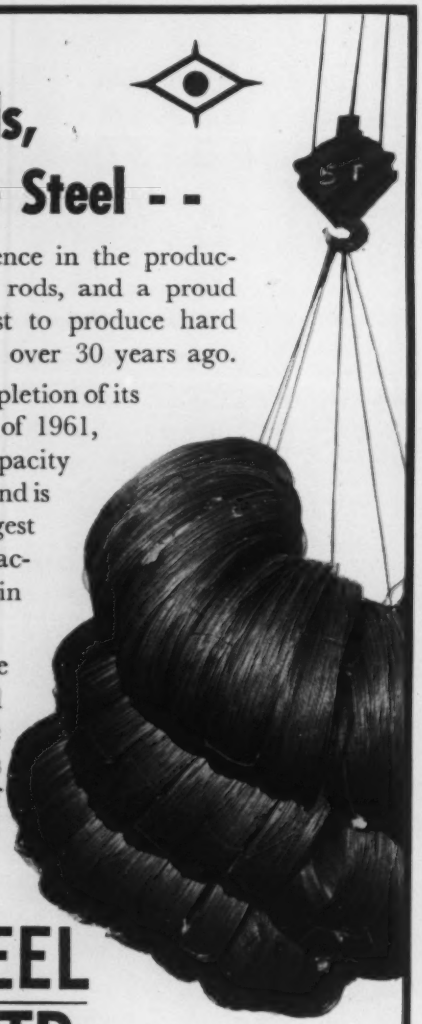
For further information, *write* Branford Co., 132 Glen St., New Britain, Conn.

For Wire Rods, Look to Kobe Steel - -

with 35 years of experience in the production of mild steel wire rods, and a proud record of being the first to produce hard steel wire rods in Japan over 30 years ago.

Kobe Steel, with the completion of its new No. 5 mill in June of 1961, now has production capacity of 740,000 tons annually and is known as the oldest, largest and most versatile manufacturer of steel wire rods in the Far East.

Particularly famous for the high quality of its hard steel and special steel wire rods, Kobe Steel exports to every major area of the world.



KOBE STEEL WORKS, LTD.

Head Office: Kobe, Japan Cable: "KOBESTEEL KOBE"
New York Office: 80 Pine St., New York 5, N.Y., U.S.A. Tel: HA-5-5270 5271
Düsseldorf Office: c/o Deutsche Nisho Import Export G.m.b.H. Düsseldorf Immermann St., 10, Germany Tel: Düsseldorf-23838

Main Products:
- Wire Products
  Plain and Galvanized Iron Wire
  Barbed Wire
  Wire Nail
  Wire Rope
  Strand Wire
  for Prestressed Concrete
- Bars, Pipes and Tubes
- Arc Welding Electrodes
- General Machinery

NEW literature

Write directly to the company for a copy

ASTM Publications List

A 62-page list of publications describes the symposiums, manuals, special publications, indexes, compilation of standards, charts, reference photographs, and reports published by the society through the years. More than 300 items are fully described (40 are new and not previously listed). American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

Blending for Coke Ovens

Literature published by B-I-F Industries discusses the problem of blending high and low volatile coals to prevent excessive expansion in coke ovens. B-I-F Industries, P. O. Box 276, Providence 1, R. I.

Fuel Injection

Injection of gaseous and liquid hydrocarbon fuels at blast furnace tuyeres is the subject of a four page bulletin. The bulletin reports instances of startling reductions in coke rate (50 to 80 lb per ton for each 1 per cent of natural gas injected) and increases in iron production (as much as 10 per cent). Specify Bulletin BTP No. 15. Hagan Chemicals & Controls Inc., Hagan Center, Pittsburgh 30, Pa.

Vacuum Deposition

Radiant heat reflective, low emissivity coatings, their properties and uses with high temperature reinforced plastics are described in a new brochure. Information includes charting of high temperature characteristics of plastic laminates (uncoated and with gold or aluminum surfaces). Ask for Bulletin No. 400-61. Swedlow Inc., 6986 Bandini Blvd., Los Angeles 22, Calif.

Welding Low Alloy Steels

A 20 page brochure discusses the welding of mild and low alloy steels. Included is a section on welding terminology, plus a section on the cause and prevention of common welding troubles, such as poor fusion, undercutting, porosity, poor weld surface, and weld cracks. McKay Co., 1005 Liberty Ave., Pittsburgh 22, Pa.

Abrasive Media Problems

Problems in the selection of the right abrasive media and compounds for use in vibratory and barrel finishing are discussed in a bulletin. Among subjects covered: Preplate finishing, burnishing, rapid cutdown, prevention of chip lodging, and extension of media life. Roto-Finish Co., 3700 Milham Rd., Kalamazoo, Mich.

Wetting Agents

A brochure suggests dozens of applications for wetting agents in metal processing, protective coatings, textiles, paper, and a variety of special uses. Uses in metal processing include alkaline cleaners, acid cleaning, pickling, electrotype cleaning, rinse baths, electroplating, and soldering and welding fluxes. Ask for Brochure No. ISP-45. Advertising Dept., Nopco Chemical Co., 60 Park Place, Newark 1, N. J.

Chopper Noise

A technical report of test techniques and compiled data on residual noise present in chopper circuits is contained in a four page bulletin. The report includes test circuit information, extensive analysis and actual test results of magnetic, electrostatic, thermal, triboelectric, electrochemical, and thermal noise and drift phenomena present in low level dc instrumentation. James Electronics Inc., 4050 N. Rockwell St., Chicago 18, Ill.

Maintenance Booklet

A 16 page maintenance booklet offers ideas on how to save time in machining parts, and how to eliminate heat treating, quench cracks, and last minute part rejections. Suggestions are given for avoiding secondary operations such as cleaning, straightening, finish grinding, and inspections to reduce downtime. Ask for Bulletin No. 24. La Salle Steel Co., P. O. Box 6800-A, Chicago 80, Ill.

Strip Mill Products

A 70 page reference book gives basic information for evaluating and ordering of strip steel, spring steel, shim steel, electrolytic galvanized strip steel, and flat wire products. Mill Strip Products Co., 2424 Oakton St., Evanston, Ill.

How our small plant solved its waste disposal problem WITHOUT CAPITAL OUTLAY...

Pat. No. 2,900,096

DEMPSTER-DUMPMASTER Equipped Hauler Provides Containers and Service for Small Fee

Our small Midwestern manufacturing firm did not generate enough refuse to justify ownership of its own refuse disposal system. Yet, it was plagued by unsightly trash piles, fire hazards and scattered refuse in the plant yard.

Our plant engineer then heard of a DEMPSTER-DUMPMASTER equipped private hauler in the adjoining city. A survey revealed that two big-capacity refuse containers, placed one at each end of the plant, would handle the entire refuse accumulation.

The private hauler placed the containers, and a small monthly fee covered maintenance, labor, hauling and dumping refuse. No capital outlay was involved, disposal costs were reduced, and plant housekeeping was vastly improved.

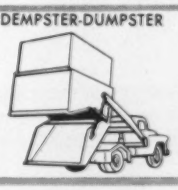
In all major cities, private haulers who own DEMPSTER-DUMPMASTER equipment render fast, efficient, low-cost refuse storage and collection service. They place one or 100 containers at your service for a reasonable fee. A free brochure describes their service in detail.

Free Brochure and Name of Nearest Private Hauler on Request

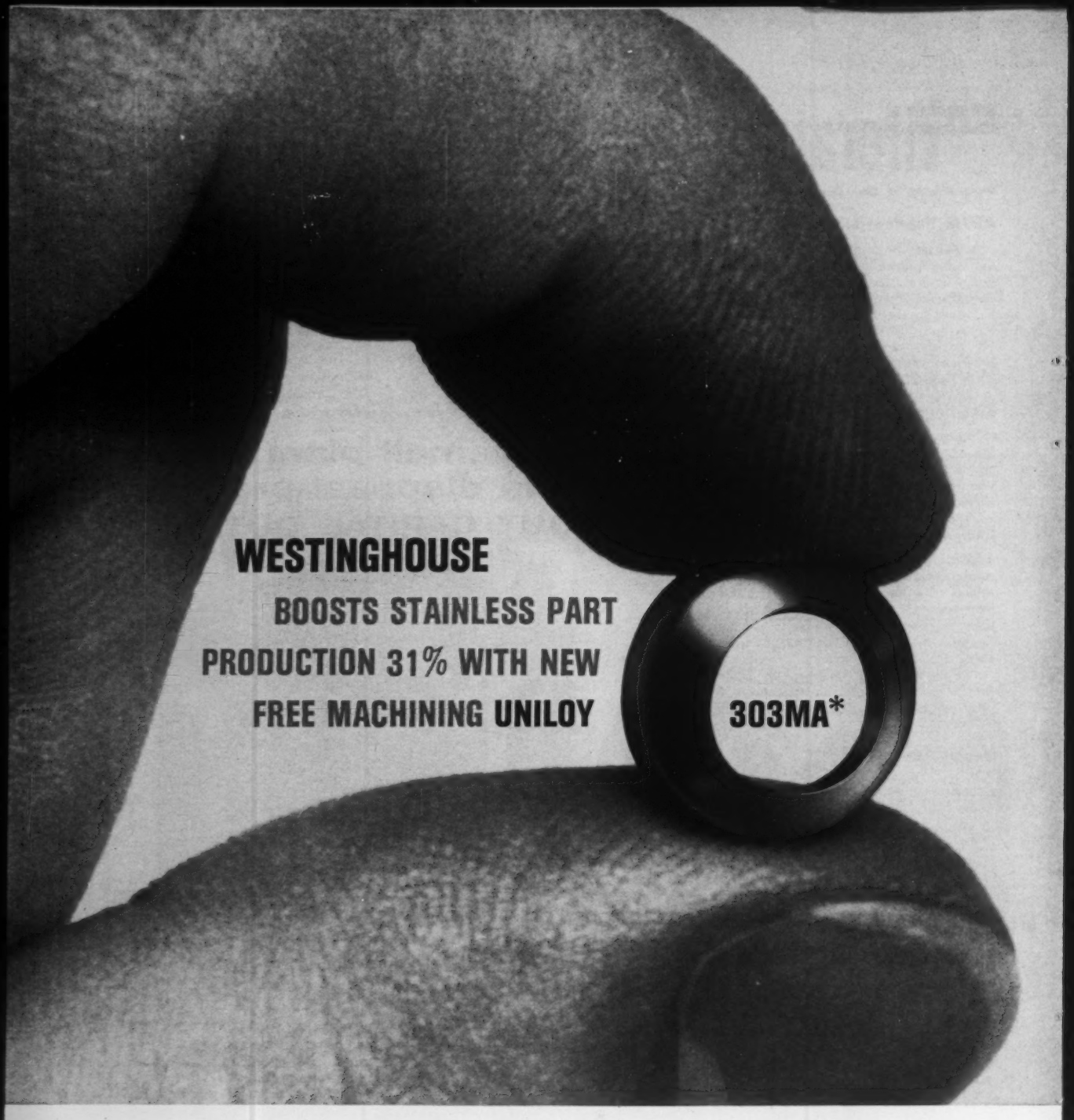
Dept. S-62, DEMPSTER BROTHERS Knoxville 17, Tenn.

DEMPSTER-DUMPMASTER

DEMPSTER-DUMPSTER



PART OF THE DEMPSTER DUMPSTER SYSTEMS ®



The Westinghouse Standard Control Division at Beaver, Pa., compared New free machining Uniloy 303MA* stainless steel with regular Type 303. The part—a close tolerance spring end support for circuit breakers and control equipment—was machined from ½-inch stock. Here are the production line results:

	AISI Type 303	New Uniloy 303MA
Spindle Speed	890	1180
Surface Ft. per Min.	115	155
No. Pieces per Hour	110	144
Tool Life	Form tool sharpened 3 times every 8 hours	Form tool sharpened once every 6 hours

New Uniloy 303MA also machined cleaner and smoother to produce higher quality parts. It is now specified in all applications formerly calling for Type 303 stainless steel at this plant.

Cut *your* production costs! Order New Uniloy 303MA at your nearest Universal-Cyclops steel service center or sales office. Ask for your copy of the "Uniloy 303MA" brochure.

*U. S. PATENT NO. 2,900,250

UNIVERSAL CYCLOPS
STEEL CORPORATION
EXECUTIVE OFFICES: BRIDGEVILLE, PA.

STAINLESS STEELS / TOOL STEELS / HIGH TEMPERATURE AND REFRACTORY METALS

S-58

Small Setbacks Seen for July

MODERATE SETBACKS in steel production and shipments next month will be followed by a gradual upturn in August and a strong recovery in September.

That's how market analysts at leading steel companies see the third quarter. The only thing that can upset the forecast, they believe, is a long strike in the automotive industry—and that's not expected. Third quarter production should be at least 24 million ingot tons (vs. 25 million in the second quarter).

SLOWDOWN IN JULY— Next month will be the slowest of the third quarter for three reasons: 1. Steelmakers will curtail finishing operations over the July 4th holiday to minimize overtime labor costs. 2. Automakers will wind up production of their 1961 models, and they already have steel on hand for that purpose. 3. Other users, such as appliance manufacturers and machine shops, will close their plants for vacations. Steel production will probably decline by 12 per cent (to 7.5 million ingot tons vs. June's 8.5 million). Shipments won't fall more than 8 per cent because there won't be a great drop in consumption. Mills will dip into their finished steel inventories to meet some of the needs of customers whose consumption will continue at a high level, such as canmakers and the construction industry.

AUTOMAKERS CLOSING EARLY— By the middle of July—three weeks earlier than last year—automakers will complete the bulk of their 1961 model runs. By the end of the month, they'll all be switching into production of next year's cars. The number of cars to be built in July is uncertain, but STEEL's sources believe automakers will bet against a strike and reduce dealer inventories of 1961 cars to a minimum before introducing next year's models. They may produce only 350,000 cars in July (vs. 540,000 in June) and 250,000 in August.

BIG GAINS IN SEPTEMBER— New orders for steel to be used in the 1962 cars are being released, and it's believed that August shipments will be substantial. At that time, other users will be ending their vacations and stepping up their consumption, so there's a good chance that August ingot production will rebound to about 8 million tons. The big spurt will come in September as automakers start turning out their new models at top speed.

INVENTORIES STABILIZED— In the meantime, users will have little incentive to order ahead or increase their inventories because steelmakers will be able to deliver most products on short notice. If fabricators or distributors increase their stocks, they'll do so only to keep abreast of rising daily consumption. Service center inventories increased by 50,000 tons in May, but they're expected to hold at the current level (about 2,950,000 tons) through the summer.

IMPORTS RISE, EXPORTS FALL— Imports of steel mill products rose for the fourth consecutive month in April, while exports dropped below those of March, the Department of Commerce reports. Imports were 235,000 tons. Exports were 138,000 tons. In the first four months of the year, imports led exports by 743,000 tons to 585,000. In the corresponding period of 1960, they were ahead by a much wider margin.

STEELMAKING SLIPS— Look for ingot production in the week ending July 1 to be slightly less than the 1,975,000 tons that STEEL estimates the industry poured in the week ended June 24. Output then was 0.5 per cent below the previous week's.

WHERE TO FIND MARKETS & PRICES

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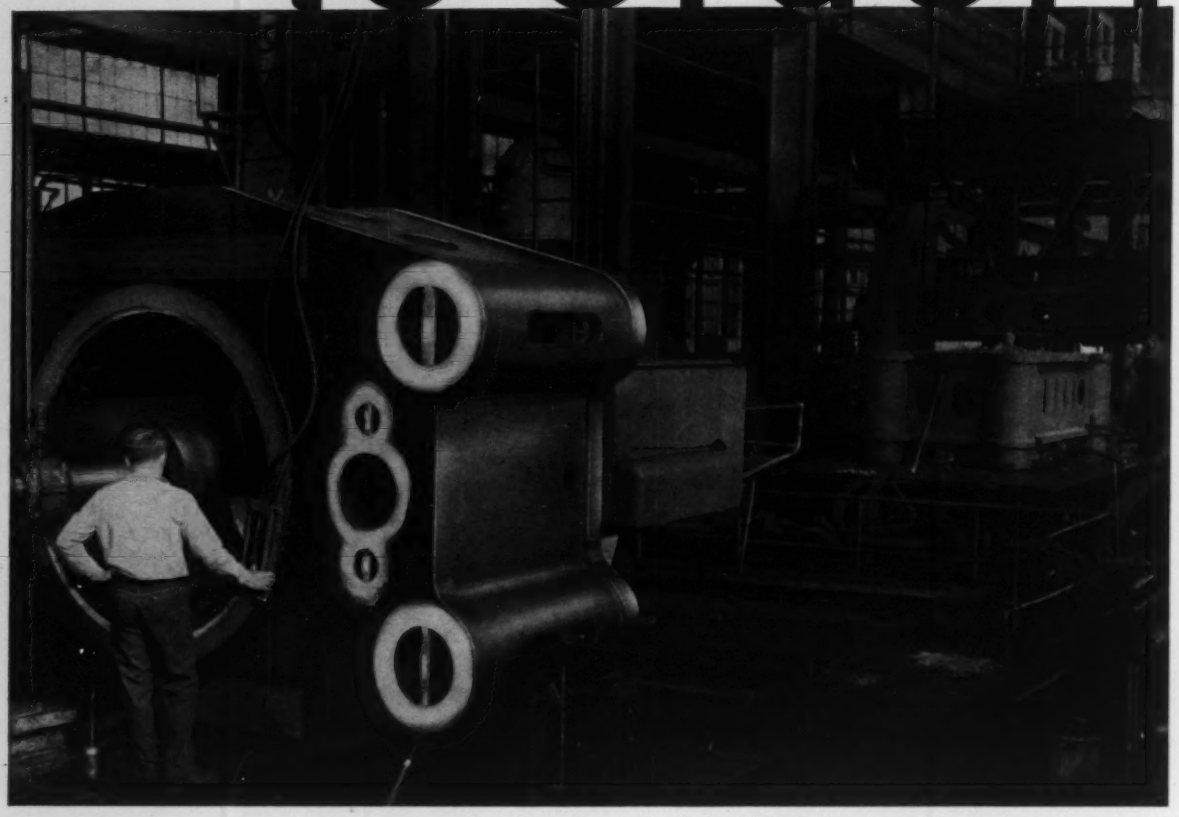
*Current prices were published in the June 19 issue and will appear in subsequent issues.

Build exactly what you want • • • to order!



VERSATILITY—that's the word for Sun Ship. And that's why you get the machinery or industrial equipment you need, built exactly to your requirements, when you specify Sun Ship.

Consider, for example, the machining operations shown above. To the left is a press cylinder being machined on a 72″ Draw-shaper and to the right is a large platen on a 14′ wide Planer. Here we custom-produce a wide variety of machinery or machine components to do difficult jobs in petroleum, chemicals, atomic power—in many fields.

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What's Happening in Nonferrous Scrap

U. S. Consumption Almost Static . . .

	ALUMINUM (Tons)	COPPER (Tons)
1957	532,000	740,000
1958	430,000	696,000
1959	539,000	847,000
1960	493,000	722,000
1961	65,000*	229,000**

While Exports Soar . . .

	ALUMINUM (Tons)	COPPER (Tons)
1957	18,000	118,984
1958	19,000	50,362
1959	32,500	40,127
1960	79,500	183,936
1961	29,200**	65,626**

Sources: Business & Defense Services Administration, Bureau of Mines, Bureau of the Census.
*First two months.
**First four months.

Exports Boon to Dealers; Bane to Smelters

TOSS the phrase "scrap exports" into any gathering of copper or aluminum men today and you're sure of a positive reaction. Over the last 18 months, exports have become a heated issue in nonferrous circles. Sellers present strong arguments for unrestricted scrap exports. Users, particularly the smelters, are equally vocal in detailing why unrestricted exports can be harmful.

• **Behind the Issue**—To understand what the hubbub is about, take a look at copper. Spiraling prices were one of the key factors in the recent bull market. The psychological factors that influenced primary metal —fears of mine closedowns in the Congo and Northern Rhodesia and the possibility of strikes in the U. S. and Chile—influenced scrap. Scrap, in turn, also became the tail that wagged the dog and was an important factor in higher copper prices.

Here's why: Heavy demand, particularly from Japan, came at a time when U. S. copper sales were rising. And because reduced industrial operations during the recession cut down on the generation of new scrap, and a severe winter in the East and Midwest hampered collections of old scrap, there wasn't enough material to meet all of the demand.

So as in any buyers' market, the material flowed to the customer who could pay the most—in this case, Japan. U. S. users found it difficult to buy scrap at a figure they could afford—hence the pressure that brought higher copper prices.

The Japanese have embarked on a heavy program to build their copper production capacity. (They can turn out about 250,000 tons of refined copper yearly compared with 100,000 tons in 1950.) Plans call for production of 500,000 tons annually by 1965.

• **Irking Users**—Since the Japanese have virtually no raw material, they must import to produce. What irks U. S. users: The Japanese levy a heavy duty on imports of refined copper, but there is no duty on imports of scrap (or ores or concentrates). Because their government props the internal copper price (presently at 39 cents a pound vs. 31 cents in the U. S.), Japanese companies can pay more for scrap on the open market than U. S. users, it's charged.

U. S. scrap dealers maintain they need no defense for selling to Japan, or any other nation—it's merely a case of material flowing to the highest bidder. Dealers also point out exports give them a much steadier market than if they relied on U. S. sales alone. They also make the point that some of the users who complain most bitterly about scrap exports have no hesitation in exporting their own products.

Certainly, statistics bear out that exports have been on the rise (see tables). The Japanese have been mainly interested in alloyed copper base scrap. Of the 122,957 tons of scrap in that category exported last

year, the Japanese took 90,773 tons. And of the 40,463 tons of alloyed scrap exported in the first four months of this year 38,453 tons went to Japan. Exports of yellow brass, radiators, refinery brass, and certain brass mill items (borings, clips, brass shells) have been particularly heavy.

Frequently overlooked in the export situation are the increasing quantities of scrap flowing to West Germany. In 1960, that country was the biggest purchaser of unalloyed copper scrap (more than 20,000 tons) and second to Japan in buying alloyed scrap.

• **Pattern for Future**—The future is full of many "ifs." The scrap price has been dropping over the last several weeks, mainly because of less buying from Japan. Scrap supplies—which are always lower when industrial activity picks up following a recession—will improve over the year. Scrap intake by the smelters rose 33 per cent in May; dealers say sufficient scrap is now available in this country.

You can look for continued heavy Japanese buying, but it will be in spurts. Some scrapmen believe Japan will take about 100,000 tons of copper scrap a year from here on out. They also look for increased sales to Europe, particularly to West Germany, Italy, and Spain. They see little change in U. S. scrap generation or consumption.

Unless there is a major disruption in supply (see Page 112), scrap prices should be more stable over the year than they have been. If conditions become tight again, you can look for more pressures on the government to establish export quotas.

You can expect scrap users to press for official talks between U. S. and Japanese representatives to ease what they consider "unfair" economic practices on the part of Japan.

• **Aluminum Story** — There's little clamor for restrictions on exports of aluminum scrap, but it has been a hot subject and it will be again. It doesn't take much effort to stir up an argument on the subject.

Scrapmen say exports are down because: 1. U. S. aluminum is available overseas at less than the domestic price. 2. An excess of metal is available in the Free World. 3. Primary producers are selling scrap overseas, both to their affiliates and on the open market.

Statistically, exports look pretty large. Through the first four months, they stood at 29,209 tons, up 9 per cent from the same period of 1960. But scrapmen say the market has dropped sharply since April.

Prices have eased some since earlier in the year. They seem to be on a plateau, and the consensus is they will remain there for the foreseeable future. The reasons: There's plenty of scrap, though no big oversupply; only moderate demand; and a stable price in primary aluminum. The trend is for more and more aluminum scrap to become available.

Aluminum smelters, who consume about 80 per cent of the scrap, complain they have to live from day to day and moment to moment as far as raw material is concerned. They concede that present supplies are adequate, but they maintain that a sudden upswing in business could bring some tightness because "there's

here's PROOF of

PHOTOS AND STATEMENT FROM

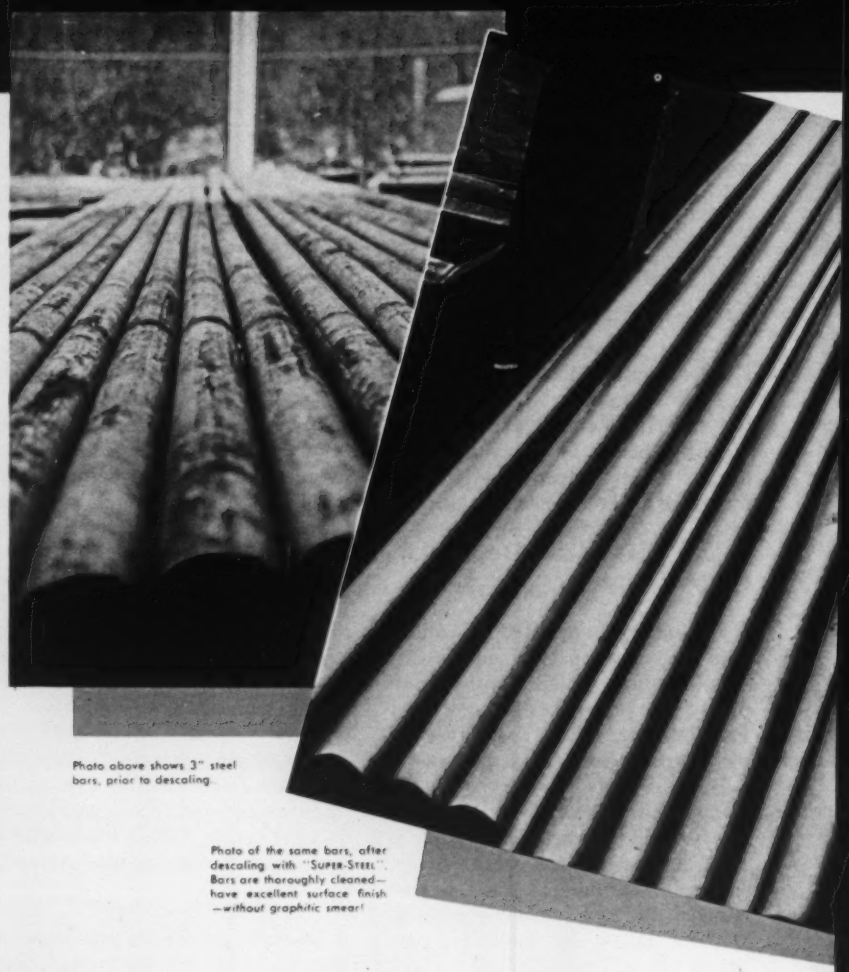


Photo above shows 3" steel bars, prior to descaling.

Photo of the same bars, after descaling with "SUPER-STEEL". Bars are thoroughly cleaned—have excellent surface finish—without graphitic smear!

little scrap inventory in this country."

A growing area of irritation to both scrapmen and some users: The so-called conversion deals—primary aluminum producers buy back the scrap a customer generates, recycle it, and pay the customer in virgin metal.

• **Lead-Zinc Dull**—Less lead and zinc scrap is being generated, but there is less demand. A big reason for both conditions is the low price on the virgin metals. An export market for lead and zinc is virtually nonexistent.

• **Magnesium Slow**—Neither supply nor demand in magnesium scrap is heavy. Prices are stable.

• **Nickel Alloys Good**—Both domestic and export sales of nickel-base alloys are good and should continue that way over the year. The supply seems adequate. Prices look stable for the foreseeable future.

• **Tightening Competition**—The $1-billion-a-year nonferrous scrap industry is faced with some tough problems and some unparalleled opportunities. On the problem side: 1. Direct dealings between generators and consumers. 2. More integrated firms are finding use of scrap in their own systems. 3. Profit margins are tightening. 4. Handling and segregation costs are up as new and more complex alloys come into common usage.

Dealers are making greater use of chemical spot testing and limited spectrographic checks for more efficient segregation. There's more automation in material handling and other processing steps.

Industry people believe that the increasing importance of some of the newer metals will mean more specialization on the part of dealers. Those who can't adapt won't survive. And, as sources of raw materials become more vulnerable and as alloys gain in complexity, scrap will become more important.

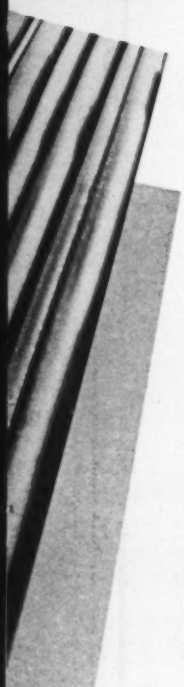
"SUPER-STEEL" performance!

SHOT OR GRIT

A PROMINENT BAR MILL IN THE PITTSBURGH AREA

Please check the photos on the opposite page carefully. They are *unretouched* photos, taken in this well-known steel plant, of 3" bar stock "before" and "after" descaling with "SUPER-STEEL" shot in centrifugal blast cleaning equipment. A letter received from their Plant Engineer states that "SUPER-STEEL" has greatly improved the surface finish of their bars and substantially reduced their blast cleaning operation costs. The letter goes on to say that they are well pleased with the abrasive engineering service provided by METAL BLAST and, finally, that they highly recommend "SUPER-STEEL" for efficient and economical cleaning for steel mill operations.

If you're not entirely satisfied with the performance (or cost) of your present steel abrasives, why not try "SUPER-STEEL"? In addition to the excellent performance and service referred to above, you'll get greater "resistance to breakdown" and lower maintenance costs — yet you pay less for "SUPER-STEEL"! You can't help but cut cleaning costs — in fact, we'll guarantee it! Write, wire or phone collect — we'll rush a trial order, test sample, more information or have our abrasive engineer call.



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May Output of Steel Ingots Best in 13 Months

Production of steel ingots in May totaled 8,978,000 net tons, the highest for any month since April, 1960, reports the American Iron & Steel Institute. Production was 18.4 per cent above April's total of 7,584,687 tons and 53.7 per cent above December's total of 5,839,841 tons —the low point last year.

The institute's index of steelmaking in May was 108.8 (average production in 1957-59 equals 100). The index figure for April was 95.

Steel production in the first five months of this year amounted to 36,304,178 net tons. That compares with 53,349,222 in the same period of 1961.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 101

Inland Steel Co., Chicago, has withdrawn its published prices on reinforcing bars. Until further notice, it will quote prices on inquiries. The action follows that taken earlier this month by U. S. Steel Corp. as a move aimed at meeting increasingly stiff competition from imports. It's expected that other leading producers will meet competition.

Steel Production Continues Downtrend

STEEL INGOT production slipped below the 2 million ton level for the week ended June 17 after holding above that mark for four consecutive weeks. STEEL estimates output for the week ended June 24 at 1,975,000 tons, an additional drop of 10,000 tons.

Consensus among steelmakers is that operations are likely to hold steady over the next few weeks and resume a strong upward swing in August.

● **Youngstown** — Reflecting the slight slowdown resulting mainly from vacation plans of many important consumers, steelmaking operations eased about 2 points during the week ended June 24 to 50 per cent of 1960 capacity. Youngstown Sheet & Tube Co. suspended two open hearths at the Campbell (Ohio) Works to avoid accumulation of slab inventories during installation of a new coiler on the 79 in. hot strip mill.

● **Buffalo** — Steelmaking operations declined about 7 points during the week ended June 24 to a rate equivalent to 51.5 per cent of 1960 capacity. Bethlehem Steel Co. shut down two additional open hearths at its Lackawanna (N. Y.) mill.

● **Birmingham** — The steelmaking rate for this district is estimated at 78 per cent of 1960 capacity for the week ended June 24, a gain of about 1 point over the preceding period. It is reliably reported that another electric furnace will be constructed in the district this year.

● **Chicago** — Operations are unchanged at a few mills but the majority are scheduling at somewhat reduced levels. The district rate for the week ended June 24 is estimated at 76 per cent of 1960 capacity, a drop of about 2 points from the previous week's rate.

● **Philadelphia**—A further easing in steel production in the Northeastern district is predicted for the week ended June 24. The American Iron & Steel Institute index for the previous week was 98.

● **Cleveland**—Steel ingot production in this district has declined to the lowest level since the week ended May 6.

Steel Ingot Production—May, 1961

Period	Open Hearth (Net tons)	Bessemer (Net tons)	Basic Oxygen Process (Net tons)	Electric (b) (Net tons)	Totals (Net tons)	Index (a)
1961						
January	5,539,900	49,609	213,255	613,240	6,416,004	77.8
February	5,347,458	68,138	225,963	597,539	6,239,098	83.7
March	6,068,244	75,694	281,698	660,753	7,086,389	85.9
1st Quarter	16,955,602	193,441	720,916	1,871,532	19,741,491	82.4
*April	6,551,518	65,503	269,991	697,675	7,584,687	95.0
†May	7,744,000	80,000	342,000	812,000	8,978,000	108.8
1960						
January	10,510,616	211,132	280,981	1,046,675	12,049,404	146.1
February	9,715,527	216,263	245,458	949,558	11,126,806	144.2
March	10,103,122	202,812	306,741	952,008	11,564,683	140.2
1st Quarter	30,329,265	630,207	833,180	2,948,241	34,740,893	143.4
April	8,603,306	105,336	302,763	766,452	9,777,857	122.5
May	7,844,140	73,010	309,505	603,817	8,830,472	107.0
June	6,441,594	80,344	314,766	568,169	7,404,873	92.7
2nd Quarter	22,889,040	258,690	927,034	1,938,438	26,013,202	107.4
1st Half	53,218,305	888,897	1,760,214	4,886,679	60,754,095	125.4
July	5,494,331	61,700	289,003	505,890	6,350,924	77.0
August	5,860,394	52,652	279,550	645,404	6,838,000	82.9
September	5,525,244	42,228	287,323	603,626	6,458,421	80.9
3rd Quarter	16,879,969	156,580	855,876	1,754,920	19,647,345	80.2
Nine Months	70,098,274	1,045,477	2,616,090	6,641,599	80,401,440	110.3
October	5,917,780	56,914	270,450	623,236	6,868,380	83.3
November	5,308,894	51,246	257,286	554,514	6,171,940	77.3
December	5,042,558	35,559	202,330	559,394	5,839,841	70.8
4th Quarter	16,269,232	143,719	730,066	1,737,144	18,880,161	77.1
2nd Half	33,149,201	300,299	1,585,942	3,492,064	38,527,506	78.7
Totals (1960)	86,367,506	1,189,196	3,346,156	8,378,743	99,281,601	101.9

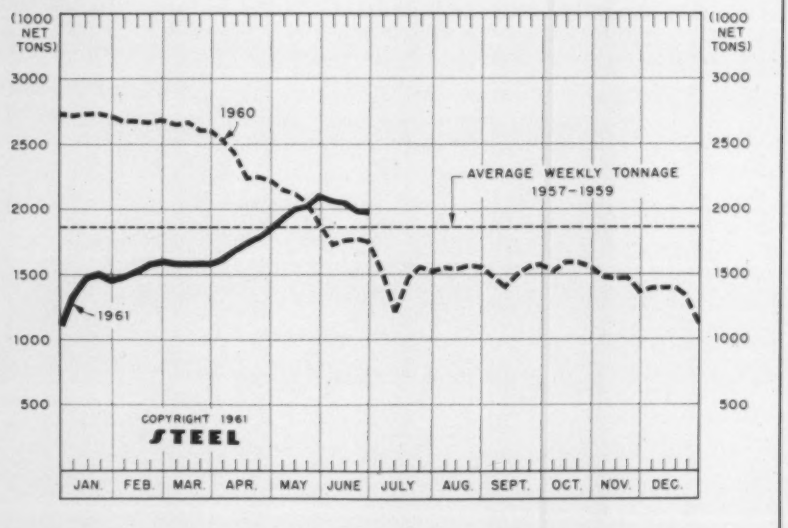
*Revised. †Preliminary. (a) Index based on average production 1957-59 as 100. (b) Includes crucible steel. Data from American Iron & Steel Institute.

STEEL INGOT PRODUCTION

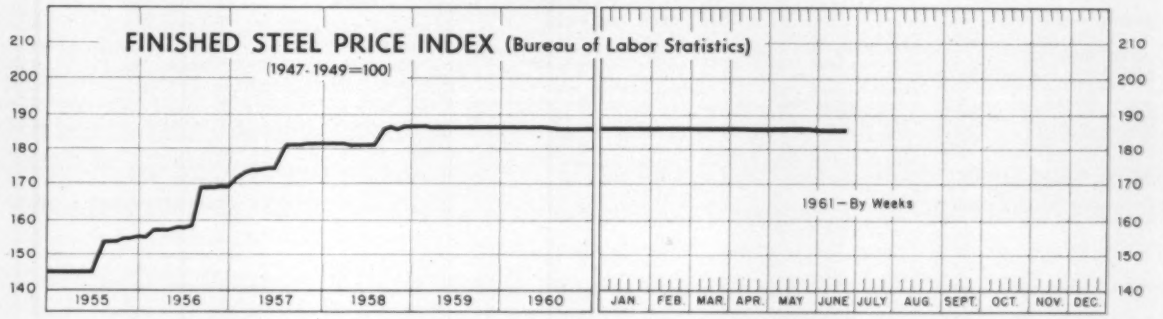
Weeks Ended	Net Tons	Change
June 24	1,975,000*	— 0.5%
June 17	1,985,000	— 2.8%
June 10	2,042,000	— 0.5%
June 3	2,052,000	— 1.2%
Totals to June 17		
1961	41,168,000	—28.0%
1960	57,137,000	

DISTRICTS	Week Ended June 17 Tons‡	Week Ended June 17 Index†	Week Ended June 10 Index†
Northeastern	261,852	98	102
Buffalo	97,355	100	108
Pittsburgh	371,265	92	95
Youngstown	159,782	94	100
Cleveland	111,114	120	126
Detroit	143,736	137	138
Chicago	418,965	112	115
Cincinnati	85,208	113	122
St. Louis	62,009	118	119
Southern	128,991	119	111
Western	139,126	119	124
Industry	1,985,000	106.6	109.6

*Estimated by STEEL.
†1957-59 (1,862,933 tons) = 100.
‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



June 20, 1961	Week Ago	Month Ago	May Index	Year Ago
185.5	185.5	186.1	186.1	186.6

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended June 20

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, H.R., Carbon	6.675
Rails, Light, 40 lb	7.292	Bars, Reinforcing	6.236
Tie Plates	6.875	Bars, C.F., Carbon	10.710
Axles, Railway	10.175	Bars, C.F., Alloy	14.125
Wheels, Freight Car, 33 in. (per wheel)	62.000	Bars, C.F., Stainless, 302 (lb)	0.570
Plates, Carbon	6.350	Sheets, H.R., Carbon	6.350
Structural Shapes	6.167	Sheets, C.R., Carbon	7.300
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, Galvanized	8.775
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, C.R., Stainless, 302 (lb)	0.643
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895	Strip, C.R., Carbon	9.225
Bars, H.R., Alloy	10.775	Strip, C.R., Stainless, 430 (lb)	0.460
Bars, H.R., Stainless, 303 (lb)	0.543	Strip, H.R., Carbon	6.250
		Pipe, Black, Buttweld (100 ft)	19.495
		Pipe, Galv., Buttweld (100 ft)	23.098
		Pipe Line (100 ft)	195.430
		Casing, Oil Well, Carbon (100 ft)	193.032
		Casing, Oil Well, Alloy (100 ft)	302.603
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.005
		Tubing, Mechanical, Stainless, 304 (100 ft)	194.268
		Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
		Black Plate, Canmaking Quality (95 lb base box)	7.900
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.665
		Bale Ties (Bundles)	7.647
		Nails, Wire, 8d Common	9.433
		Wire, Barbed (80-rod spool)	8.372
		Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	June 21 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg = 100)	247.82	247.82	247.82	247.82	210.45
Index in cents per lb	6.713	6.713	6.713	6.713	5.701

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$128.98
No. 2 Fdry., Pig Iron, GT	66.49	66.49	66.49	66.49	60.27
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	59.80
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	61.27
Steelmaking Scrap, GT	37.83	38.17	36.33	31.33	46.00

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL

	June 21 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.975	4.93
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.25
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	5.00
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.80
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	5.35
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.25-6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.60
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.85

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts.	6.40	6.40	6.40	6.40	5.375

PIG IRON, Gross Ton

	June 21 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$61.00
Basic, Valley	66.00	66.00	66.00	66.00	60.00
Basic, deld., Philadelphia	70.18	70.18	70.18	70.41	63.76
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	60.50
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	60.50
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	64.26
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	60.50
Malleable, Chicago	66.50	66.50	66.50	66.50	60.50
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	215.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pittsburgh	$36.50	$36.50	$34.50	$30.50	$44.50
No. 1 Heavy Melt, E. Pa.	39.50	39.50	39.00	34.00	47.50
No. 1 Heavy Melt, Chicago	37.50	38.50	35.50	29.50	46.00
No. 1 Heavy Melt, Valley	38.50	38.50	37.50	32.50	47.50
No. 1 Heavy Melt, Cleve.	35.50	35.50	34.50	31.50	45.50
No. 1 Heavy Melt, Buffalo	31.50	31.50	31.50	30.50	45.50
Rails, Rerolling, Chicago	58.50	58.50	57.50	49.50	67.50
No. 1 Cast, Chicago	42.50	43.50	41.50	40.50	45.50

COKE, Net Ton

Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$14.125
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	27.50

Steel Prices

Mill prices as reported to STEEL, June 21, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 101; footnotes, page 103.

SEMIFINISHED

INGOTS, Carbon Forging (NT)
Munhall,Pa. U5 ....$76.00

INGOT, Alloy (NT)
Detroit S41 ....$82.00
Economy,Pa. B14 ....82.00
Farrell,Pa. S3 ....82.00
Lowellville,O. S3 ....82.00
Midland,Pa. C18 ....82.00
Munhall,Pa. U5 ....82.00
Sharon,Pa. S3 ....82.00

BILLETS, BLOOMS & SLABS
Carbon Rerolling (NT)
Bartonville,Ill. K4 ...$82.00
Bessemer,Pa. U5 ....80.00
Buffalo R2 ....80.00
Clairton,Pa. U5 ....80.00
Ensley,Ala. T2 ....80.00
Fairfield,Ala. T2 ....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 ....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 ....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 ....80.00
Youngstown R2 ....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 ....99.50
Canton,O. R2 ....102.00
Clairton,Pa. U5 ....99.50
Conshohocken,Pa. A3 ..99.50
Ensley,Ala. T2 ....99.50
Fairfield,Ala. T2 ....99.50
Farrell,Pa. S3 ....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 ....99.50
Geneva,Utah C11 ....99.50
Houston S5 ....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 ....109.00
Midland,Pa. C18 ....99.50
Munhall,Pa. U5 ....99.50
Owensboro,Ky. C8 ....99.50
Seattle B3 ....109.00
Sharon,Pa. S3 ....99.50
S.Chicago R2, U5, W14 ..99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ..109.00
Warren,O. C17 ....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32 ..119.00
Buffalo R2 ....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 ..121.00
Detroit S41 ....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 ....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 ....119.00
Houston S5 ....124.00
Ind.Harbor,Ind. Y1 ..119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 ....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 ....119.00
Midland,Pa. C18 ....119.00
Munhall,Pa. U5 ....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 ....140.00
Sharon,Pa. S3 ....119.00
S.Chicago R2,U5,W14..119.00
S.Duquesne,Pa. U5 ..119.00
Struthers,O. Y1 ....119.00
Warren,O. C17 ....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 ....$122.50
Canton,O. R2 ....125.00
Cleveland R2 ....122.50
Gary, Ind. U5 ....122.50
S.Chicago,Ill. R2,W14..122.50
S.Duquesne,Pa. U5 ..122.50
Warren,O. C17 ....122.50

SKELP
Aliquippa,Pa. J5 ....5.05
Benwood,W.Va. W10 ...5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 ....5.05
Pittsburgh J5 ....5.05
Warren,O. R2 ....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ..6.40
Aliquippa,Pa. J5 ....6.40
Alton,Ill. L1 ....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 ....6.40
Cleveland A7 ....6.40
Donora,Pa. A7 ....6.40
Fairfield,Ala. T2 ....6.40
Houston S5 ....6.65
IndianaHarbor,Ind. Y1 .6.40
Johnstown,Pa. B2 ....6.40
Joliet,Ill. A7 ....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 ....6.50
LosAngeles B3 ....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 ....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 ....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 ....6.50
Struthers,O. Y1 ....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 ....5.50
Atlanta A11 ....5.70
Bessemer,Ala. T2 ....5.50
Bethlehem,Pa. B2 ....5.55
Birmingham C15 ....5.50
Clairton,Pa. U5 ....5.50
Fairfield,Ala. T2 ....5.50
Fontana,Calif. K1 ....6.30
Gary,Ind. U5 ....5.50
Geneva,Utah C11 ....5.50
Houston S5 ....5.60
Ind.Harbor,Ind. I-2, Y1..5.50
Johnstown,Pa. B2 ....5.55
Joliet,Ill. P22 ....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ...5.55
LosAngeles B3 ....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 ....5.50
Niles,Calif. P1 ....6.25
Phoenixvill,Pa. P4 ....5.55
Portland,Oreg. O4 ....6.25
Seattle B3 ....6.25
S.Chicago,Ill. U5, W14 ..5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 ....5.50
Struthers,O. Y1 ....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 ....5.55
Clairton,Pa. U5 ....5.50
Fontana,Calif. K1 ....6.45
IndianaHarbor,Ind. I-2 ..5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 ....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 ....5.50
Sterling,Ill. N5 ....5.50
Weirton,W.Va. W6 ....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....6.90
Munhall,Pa. U5 ....6.80
S.Chicago,Ill. U5, W14 ..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 ....8.05
Bessemer,Ala. T2 ....8.05
Bethlehem,Pa. B2 ....8.10
Clairton,Pa. U5 ....8.05
Fairfield,Ala. T2 ....8.05
Fontana,Calif. K1 ....8.85
Gary,Ind. U5 ....8.05
Geneva,Utah C11 ....8.05
Houston S5 ....8.15
Ind.Harbor,Ind. I-2, Y1 .8.05
Johnstown,Pa. B2 ....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ...8.10
LosAngeles B3 ....8.75
Munhall,Pa. U5 ....8.05
Phoenixville,Pa. P4 ....8.10
Seattle B3 ....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 ....7.75
Struthers,O. Y1 ....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 ....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ...8.10
Munhall,Pa. U5 ....8.05
S.Chicago,Ill. U5 ....8.05
Sterling,Ill. N15 ....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 ....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 ....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbo,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ...6.50
Munhall,Pa. U5 ....6.50
S.Chicago,Ill. I-2, U5 ....6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ...5.30
Aliquippa,Pa. J5 ....5.30
Ashland,Ky.(15) A10 ...5.30
Atlanta A11 ....5.50
Bessemer,Ala. T2 ....5.30
Clairton,Pa. U5 ....5.30
Claymont,Del. P4 ....5.30
Cleveland J5, R2 ....5.30
Coatesville,Pa. L7 ....5.30
Conshohocken,Pa. A3 ...5.30
Ecorse,Mich. G5 ....5.30
Fairfield,Ala. T2 ....5.30
Farrell,Pa. S3 ....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 ....5.30
Geneva,Utah C11 ....5.30
GraniteCity,Ill. G4 ....5.40
Houston S5 ....5.40
Ind.Harbor,Ind. I-2, Y1..5.30
Johnstown,Pa. B2 ....5.30
Lackawanna,N.Y. B2 ..5.30
Mansfield,O. E6 ....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 ....5.30
Newport,Ky. A2 ....5.30
Pittsburgh J5 ....5.30
Riverdale,Ill. A1 ....5.30
Seattle B2 ....6.20
Sharon,Pa. S3 ....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 ....5.30
Warren,O. R2 ....5.30
Youngstown U5, Y1 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. P4 ....7.05
Fontana,Calif. K1 ....7.85
Geneva,Utah C11 ....7.05
Houston S5 ....7.15
Johnstown,Pa. B2 ....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 ....14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 ....7.95
Ashland,Ky. A10 ....7.95
Bessemer,Ala. T2 ....7.95
Clairton,Pa. U5 ....7.95
Claymont,Del. P4 ....7.95
Cleveland J5, R2 ....7.95
Coatesville,Pa. L7 ....7.95
Conshohocken,Pa. A3 ..7.95
Economy,Pa. B14 ....7.95
Ecorse,Mich. G5 ....7.95
Fairfield,Ala. T2 ....7.95
Farrell,Pa. S3 ....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 ....7.95
Geneva,Utah C11 ....7.95
Houston S5 ....8.05
Ind.Harbor,Ind. I-2, Y1..7.95
Johnstown,Pa. B2 ....7.95
Munhal,Pa. U5 ....7.95
Pittsburgh J5 ....7.95
Seattle B3 ....8.85
Sharon,Pa. S3 ....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 ....7.625
Warren,O. R2 ....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 ....7.50
Claymont,Del. P4 ....7.50
Coatesville,Pa. L7 ....7.50
Economy,Pa. B14 ....7.50
Farrell,Pa. S3 ....7.50
Fontana,Calif. K1 ....8.30
Gary,Ind. U5 ....7.50
Houston S5 ....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 ....7.50
Lowellville,O. S3 ....7.50
Munhall,Pa. U5 ....7.50
Newport,Ky. A2 ....7.50
Pittsburgh J5 ....7.50
Seattle B3 ....8.40
Sharon,Pa. S3 ....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 ....7.50

FLOOR PLATES
Cleveland J5 ....6.375
Claymont,Del. P4 ....6.375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor,Ind. I-2 ..6.375
Munhall,Pa. U5 ....6.375
Pittsburgh J5 ....6.375
S.Chicago,Ill. U5 ....6.375

PLATES, Ingot Iron
Ashland c.l.(15) A10 ...5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R22 ....6.05
Warren,O. R2 ....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 ....5.875
Atlanta(9) A11 ....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 ....5.675
Canton,O.(23) R2 ....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 ....5.675
Ecorse,Mich.(9) G5 ....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ..5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 ....5.675
Houston(9) S5 ....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 ....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 ....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 ....5.825
Minnequa,Colo. C10....6.125
Niles,Calif. P1 ....6.375
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11..6.375
Pittsburgh(9) J5 ....5.675
Portland,Oreg. O4 ....6.425
Riverdale,Ill.(9) A1 ...5.675
Seattle(9) A24,B3,N15 ..6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9) B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11..6.375
Warren,O. C17 ....6.025
Youngstown(9) R2, U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 ....6.725
Bethlehem,Pa. B2 ....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 ....6.725
Canton,O. R2, T7 ....6.725
Clairton,Pa. U5 ....6.725
Detroit S41 ....6.725
Economy,Pa. B14 ....6.725
Ecorse,Mich. G5 ....6.725
Farrell,Pa. S3 ....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 ....6.725
Houston S5 ....6.975
Ind.Harbor,Ind. I-2, Y1..6.725
Johnstown,Pa. B2 ....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ...6.725
LosAngeles B3 ....7.775
Lowellville,O. S3 ....6.725
Massillon,O. R2 ....6.725
Midland,Pa. C18 ....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 ....6.725
Seattle(6) B3 ....7.825
Sharon,Pa. S3 ....6.725
S.Chicago R2, U5, W14 6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 ....6.725
Warren,O. C17 ....6.725
Youngstown U5 ....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 ....8.30
Bessemer,Ala. T2 ....8.30
Bethlehem,Pa. B2 ....8.30
Clairton,Pa. U5 ....8.30
Cleveland R2 ....8.30
Ecorse,Mich. G5 ....8.30
Fairfield,Ala. T2 ....8.30
Fontana,Calif. K1 ....9.00
Gary,Ind. U5 ....8.30
Houston S5 ....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 ....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ...8.30
LosAngeles B3 ....9.00
Pittsburgh J5 ....8.30
Seattle B3 ....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Sterling,Ill. N15 ....7.925
Struthers,O. Y1 ....8.30
Youngstown U5 ....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 ....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ...5.675
Sterling,Ill. N15 ....5.775
Sterling,Ill.(1) N15 ...5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 ....5.675
Atlanta A11 ....5.875
Joliet,Ill. P22 ....5.675
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 ....6.375
Pittsburgh J5 ....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 ....6.52
Seattle B3 ....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Economy,Pa. B14 ....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 ....6.80
Youngstown U5 ....6.80

BARS, C.F. Leaded (Including leaded extra) Carbon
LosAngeles P2, S30..11.75*

Alloy
Ambridge,Pa. W18 ...10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 ....10.35
Chicago W18 ....10.175
Elyria,O. W8 ....10.175
Monaca,Pa. S17 ....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2 7.65
Birmingham C15 ....8.25
Buffalo B5 ....7.70
Camden,N.J. P13 ....8.10
Carnegie,Pa. C12 ....7.65
Chicago W18 ....7.65
Cleveland A7, C20 ....7.65
Detroit B5, H5, P17 ....7.85
Detroit S41 ....7.65
Donora,Pa. A7 ....7.65
Elyria,O. W8 ....7.65
FranklinPark,Ill. N5 ....7.65
Gary,Ind. R2 ....7.65
GreenBay,Wis. F7 ....7.65
Hammond,Ind. J5, L2 ..7.65
Hartford,Conn. R2 ....8.15
Harvey,Ill. B5 ....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 ....7.65
Monaca,Pa. S17 ....7.65
Newark,N.J. W18 ....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 ....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 ....9.10
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 ....7.65
Warren,O. C17 ....7.65
Waukegan,Ill. A7 ....7.65
Willimantic,Conn. J5 ..8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Alloy (Turned and Ground)
Cumberland,Md.(5) C19..6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2 ....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 ....9.025
Camden,N.J. P13 ....9.20
Canton,O. T7 ....9.025
Carnegie,Pa. C12 ....9.025
Chicago W18 ....9.025
Cleveland A7, C20 ....9.25
Detroit B5, P17 ....9.225
Detroit H5, S41 ....9.025
Donora,Pa. A7 ....9.025
Elyria,O. W8 ....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 ....9.025
GreenBay,Wis. F7 ....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 ....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ...9.325

Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 ....9.20
Plymouth,Mich. P5 ...9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 ....9.20
Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.00
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ..6.425
Fontana,Calif. K1 ...6.375
Ft.Worth,Tex. (26) T4..5.50
Houston S5 .....5.675
Ind.Harbor,Ind. Y1 ....5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2 ..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.475
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ..6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. R2, W14..5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2 ..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill. (1) N15 ..5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ..6.10
Youngstown R2, ...5.675

BARS, Reinforcing, Billet (Fabricated, to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Johnstown,Pa. B2 .....7.33
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ..7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 16.10
Economy,Pa.(D.R.)B14 20.50
Econ.(DirectRolled)B14 13.55
Economy(Staybolt) B14 20.50
McK.Rks.(S.R.) L5 ...16.10
McK.Rks.(D.R.) L5 ...20.50
McK.Rks.(DirRolled)L5 13.55

BARS, Rail Steel

ChicagoHts.(3) C2, I-2 5.575
ChicagoHts.(4)(44) I-2 5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ...5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 .....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1..5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 .....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 .5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 .....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ..7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14..7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2 .7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ...6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ..7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2 .6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 ....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.125	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.125	....
Fairfield,Ala. T2	7.125	7.375
Gary,Ind. U5	7.125	7.375
GraniteCity,Ill.G4	7.225	....
Ind.Harbor I-2	7.225	7.425
Irvin,Pa. U5	7.125	7.375
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.125	7.375
Pitts.,Calif. C11	7.875	....
Pittsburgh J5	7.125	....
SparrowsPt. B2	7.225	....
Weirton W6	7.125	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2....7.475

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Longe Terne, Steel

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) 9.525

SHEETS, Well Casing

Fontana,Calif. K1 .....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.175
Irvin,Pa. U5 .....7.175

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Canfield,O. C3 .....7.50
Cleveland (28) R2 ....7.65
Niles,O. (28) R2 .....7.65
Weirton,W.Va. W6 ....7.50

SHEETS, Galvanized Steel Hot-Dipped§

AlabamaCity,Ala. R2 .6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ..6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous. §For minimum spangled add 0.15c.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C3 Canfield Steel Co.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N. Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H5 Hercules Drawn Steel
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil.Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 RelianceDiv.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div. Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw&SteelCo.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada

T2 Tenn. Coal & Iron Div. U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L1 .....5.30
Ashland,Ky.(8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer,Ala T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 .....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1.5.10
Johnstown,Pa.(25) B2 ..5.10
Lackaw'na,N.Y.(25) B2.5.10
LosAngeles(25) B3 ....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 ....5.10
S.SanFrancisco(25) B3 ..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ....8.40
KansasCity,Mo. S5 .....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 ....8.40
S.Chicago,Ill. W14 ....8.40
Youngstown U5, Y1 ....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2, Y1.7.575
Lackawanna,N.Y. B2 ..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3.8.325
SparrowsPoint,Md. B2 .7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ...7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ....5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7 .....7.425
Dearborn,Mich. S3 ...7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 .....7.425
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ...7.425
Ind.Harbor,Ind. Y1 ....7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ...9.30
McKeesport,Pa. E10 ...7.525
NewBedford,Mass. R10.7.875
NewBritain,Conn. S15 .7.875
NewCastle,Pa. B4, M23.7.425
NewHaven,Conn. D2 ...7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3, N8.7.975
Philadelphia P24 .....7.575
Riverdale,Ill. A1 .....7.425
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ...8.875
Warren,O. R2, T5 .....7.425
Worcester,Mass. A7 ...7.975
Youngstown Y1 .....7.425
Youngstown S41 .....7.425

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Carnegie,Pa. S18 .....15.55
Cleveland A7 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 .....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. S8 .....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ....10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	8.95	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
New York W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	...	18.85	22.95	27.80
Buffalo W12	...	18.85	....	....
Fostoria,O. S1	...	19.05	22.15	....
FranklinPark,Ill. T6	...	19.20	23.30	28.15
Harrison,N.J. C18	...	18.85	22.95	27.80
NewYork W3	...	18.85	22.95	27.80
Palmer,Mass. W12	...	18.85	....	....
Trenton,N.J. R5	...	18.85	22.95	27.80
Worcester,Mass. A7, T6	...	18.85	22.95	27.80
Youngstown S41	...	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7 .....7.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ....7.525*
McKeesport,Pa. E10 ..7.50*
NewCastle,Pa. M23 ..7.425*
Riverdale,Ill. A1 ....7.525*
Warren,O. B9, S3, T5.7.425*
Worcester,Mass. A7 ...7.975
Youngstown S41 .....7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 ....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.10	9.35	9.75
Fairless,Pa. U5	9.10	9.35	9.75
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorksville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLITIC THIN TIN PLATE (¼ lb coating in coils)

	Base Box			
	45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.10	$6.25	$6.40	$6.55
Fairless,Pa. U5	6.10	6.25	6.40	6.55
Gary,Ind. U5	6.10	6.25	6.40	6.55
IndianaHarbor,Ind. I-2	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55
Weirton,W.Va. W6	6.10	6.25	6.40	6.55

Tin Plate,Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.40	10.65
Fairless,Pa. U5	10.40	10.65
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.20
Fairless,Pa. U5	8.20
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)

Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coil annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ...8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 ....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 ....8.00
Crawfordsville,Ind. M8..8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 ....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 ....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 ....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ....8.25
Monessen,Pa. P7, P16 ..8.00
Palmer,Mass. W12 ....8.30
Pittsburg,Calif. C11 ..8.95
Portsmouth,O. P12 ....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2 ..8.10
Sterling,Ill.(1) N15 ....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ...8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 ....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa.(10) B2 .12.65
KansasCity,Mo. U3 ...12.90
LosAngeles(2) B3 ....13.60
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16..12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ..12.95
Palmer,Mass. W12 ....13.70
Pittsburg,Calif. C11 ...13.45
Portsmouth,O. P12 ....12.65
Roebling,N. J. R5 ....12.95
SparrowsPt.,Md.(10)B2 12.75
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 ....12.65
Worcester,Mass. A7 ...12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 ....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
NewHaven,Conn. A7 ..10.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ..10.075
Portsmouth,O. P12 ....9.75
Roebling,N. J. R5 ....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt.,Md. B2 ...9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7 ...10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 ....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 ....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 ..... 10.20
Milbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ..... 10.20
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt.,Md. B2 ...9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. M8.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ...16.65
Johnstown,Pa. B2 ....16.30
KansasCity,Mo. S5 ....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ....16.55
Monessen,Pa. P16 .....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 ....16.60
S.SanFrancisco C10 ....17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

ROPE WIRE (A)

Bartonville,Ill. K4 ....13.45
Buffalo W12 .....13.45
Fostoria,O. S41 .....13.45
Johnstown,Pa. B2 ....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 ....13.75
Portsmouth,O. P12 ....13.45
Roebling,N.J. R5 .....13.75
St.Louis L8 .....13.45
SparrowsPt.,Md. B2 ...13.55
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 ...13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	.17.15
Monessen,Pa. P16	.17.15
Roebling,N.J. R5	.17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	.12.35
Baltimore T6	.12.65
Boston T6	.12.65
Buffalo W12	.12.35
Chicago W13	.12.45
Cleveland A7	.12.35
Crawfordsville,Ind. M8	.12.35
Dover,O. G6	.12.35
Evanston,Ill. M22	.12.45
Farrell,Pa. S3	.12.35
Fostoria,O. S1	.12.35
FranklinPark,Ill. T6	.12.45
Kokomo,Ind. C16	.12.35
Massillon,O. R8	.12.35
Milwaukee C23	.12.55
Monessen,Pa. P7, P16	.12.35
NewCastle,Pa. M23	.12.35
Palmer,Mass. W12	.12.65
Pawtucket,R.I. N8	.12.65
Philadelphia P24	.12.65
Riverdale,Ill. A1	.12.45
Rome,N.Y. R6	.12.35
Sharon,Pa. S3	.12.35
Trenton,N.J. R5	.12.65
Warren,O. B9	.12.35
Worcester,Mass. A7, T6	.12.65

NAILS, Stock Sizes — Col.

AlabamaCity,Ala. R2	.173
Aliquippa,Pa. J5	.173
Atlanta A11	.173
Bartonville,Ill. K4	.175
Chicago W13	.173
Cleveland A9	.173
Crawfordsville,Ind. M8	.175
Donora,Pa. A7	.173
Duluth A7	.173
Fairfield,Ala. T2	.173
Houston S5	.178
Jacksonville,Fla. M8	.175
Johnstown,Pa. B2	.173
Joliet,Ill. A7	.173
KansasCity,Mo. S5	.178
Kokomo,Ind. C16	.175
Minnequa,Colo. C10	.178
Monessen,Pa. P7	.173
Pittsburg,Calif. C11	.192
Rankin,Pa. A7	.173
S.Chicago,Ill. R2	.173
SparrowsPt.,Md. B2	.175
Sterling,Ill.(7) N15	.175
Worcester,Mass. A7	.179

(To Wholesalers: per cwt)

Galveston,Tex. D7	.$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10	.$10.10

POLISHED STAPLES — Col.

AlabamaCity,Ala. R2	.175
Aliquippa,Pa. J5	.173
Atlanta A11	.173
Bartonville,Ill. K4	.175
Crawfordsville,Ind. M8	.177
Donora,Pa. A7	.173
Duluth A7	.173
Fairfield,Ala. T2	.173
Houston S5	.180
Jacksonville,Fla. M8	.177
Johnstown,Pa. B2	.173
Joliet,Ill. A7	.173
KansasCity,Mo. S5	.180
Kokomo,Ind. C16	.177
Minnequa,Colo. C10	.178
Pittsburg,Calif. C11	.194
Rankin,Pa. A7	.173
S.Chicago,Ill. R2	.175
SparrowsPt.,Md. B2	.175
Sterling,Ill.(7) N15	.175
Worcester,Mass. A7	.179

TIE WIRE, Automatic Baler

(14½ Ga.) (per 97 lb net box) Coil No. 3150

AlabamaCity,Ala. R2	.$8.78
Atlanta A11	.10.36
Bartonville,Ill. K4	.8.88
Buffalo W12	.10.26
Chicago W13	.9.24
Crawfordsville,Ind. M8	.8.88
Donora,Pa. A7	.8.78
Duluth A7	.8.78
Fairfield,Ala. T2	.8.78
Houston S5	.9.02
Jacksonville,Fla. M8	.8.88
Johnstown,Pa. B2	.8.78
Joliet,Ill. A7	.8.78
KansasCity,Mo. S5	.9.02
Kokomo,Ind. C16	.8.88
LosAngeles B3	.9.20
Minnequa,Colo. C10	.8.02
Pittsburg,Calif. C11	.9.20
S.Chicago,Ill. R2	.8.78
S.SanFrancisco C10	.9.94
SparrowsPt.,Md. B2	.8.88
Sterling,Ill.(37) N15	.8.88

Coil No. 6500 Stand. 100 lb coil

AlabamaCity,Ala. R2	.$9.06
Atlanta A11	.10.70
Bartonville,Ill. K4	.9.16
Buffalo W12	.10.60
Chicago W13	.9.54
Crawfordsville,Ind. M8	.9.16
Donora,Pa. A7	.9.06
Duluth A7	.9.06
Fairfield,Ala. T2	.9.06
Houston S5	.9.30
Jacksonville,Fla. M8	.9.16
Johnstown,Pa. B2	.9.06
Joliet,Ill. A7	.9.06
KansasCity,Mo. S5	.9.30
Kokomo,Ind. C16	.9.16
LosAngeles B3	.9.50
Minnequa,Colo. C10	.9.30
Pittsburg,Calif. C11	.9.50
S.Chicago,Ill. R2	.9.06
S.SanFrancisco C10	.10.26
SparrowsPt.,Md. B2	.9.16
Sterling,Ill.(37) N15	.9.16

Coil No. 6500 Interim 100 lb coil

AlabamaCity,Ala. R2	.$9.11
Atlanta A11	.10.75
Bartonville,Ill. K4	.9.21
Buffalo W12	.10.65
Chicago W13	.9.59
Crawfordsville,Ind. M8	.9.21
Donora,Pa. A7	.9.11
Duluth A7	.9.11
Fairfield,Ala. T2	.9.11
Houston S5	.9.35
Jacksonville,Fla. M8	.9.21
Johnstown,Pa. B2	.9.11
Joliet,Ill. A7	.9.11
KansasCity,Mo. S5	.9.35
Kokomo,Ind. C16	.9.21
LosAngeles B3	.9.55
Minnequa,Colo. C10	.9.35
Pittsburg,Calif. C11	.9.55
S.Chicago,Ill. R2	.9.11
S.SanFrancisco C10	.10.31
SparrowsPt.,Md. B2	.9.21
Sterling,Ill.(37) N15	.9.21

BALE TIES, Single Loop — Col.

AlabamaCity,Ala. R2	.212
Atlanta A11	.212
Bartonville,Ill. K4	.214
Crawfordsville,Ind. M8	.214
Donora,Pa. A7	.212
Duluth A7	.212
Fairfield,Ala. T2	.212
Houston S5	.217
Jacksonville,Fla. M8	.214
Joliet,Ill. A7	.212
KansasCity,Mo. S5	.217
Kokomo,Ind. C16	.214
Minnequa,Colo. C10	.217
SparrowsPt.,Md. B2	.214
Sterling,Ill.(7) N15	.214

FENCE POSTS — Col.

Birmingham C15	.177
ChicagoHts.,Ill. C2 I-2	.177
Duluth A7	.177
Franklin,Pa. F5	.177
Johnstown,Pa. B2	.177
Marion,O. P11	.177
Minnequa,Colo. C10	.182
Tonawanda,N.Y. B12	.177

WIRE, Barbed — Col.

AlabamaCity,Ala. R2	.193**
Aliquippa,Pa. J5	.190‖
Atlanta A11	.197*
Bartonville,Ill. K4	.199
Crawfordsville,Ind. M8	.198
Donora,Pa. A7	.193†
Duluth A7	.193†
Fairfield,Ala. T2	.193†
Houston S5	.198**
Jacksonville,Fla. M8	.198
Johnstown,Pa. B2	.196‖
Joliet,Ill. A7	.193†
KansasCity,Mo. S5	.198**
Kokomo,Ind. C16	.195†
Minnequa,Colo. C10	.198**
Monessen,Pa. P7	.196‖
Pittsburg,Calif. C11	.213†
Rankin,Pa. A7	.193†
S.Chicago,Ill. R2	.193**
SparrowsPoint,Md. B2	.198‖
Sterling,Ill.(7) N15	.198

WIRE (16 gage)	**Stone**	**An'ld Galv. Stone**
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa. J5	.17.85	19.65
Bartonville K4	.17.95	19.80
Chicago W13	.17.85	....
Cleveland A7	.17.85	....
Craw'sville M8	.17.95	19.80‡‡
Fostoria,O. S1	.18.35	19.90†
Houston S5	.18.10	19.65**
Jacksonville M8	17.95	19.80‡‡
Johnstown B2	.17.85	19.65‖
Kan.City,Mo. S5	.18.10	....
Kokomo C16	.17.95	19.50†
Minnequa C10	.18.10	19.65**
P'lm'r,Mass.W12	19.10	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
SparrowsPt. B2	.17.95	19.75‖
St'ling(37) N15	.17.95	19.80
Waukegan A7	.17.85	19.40†
Worcester A7	.18.15	....

WOVEN FENCE, 9-15 Ga. — Col.

Ala.City,Ala. R2	.187**
Aliq'ppa,Pa.9-11½ga. J5	190‖
Atlanta A11	.191*
Bartonville,Ill. K4	.193
Crawfordsville,Ind. M8	.192
Donora,Pa. A7	.187†
Duluth A7	.187†
Fairfield,Ala. T2	.187†
Houston S5	.192**
Jacksonville,Fla. M8	.192
Johnstown,Pa.(42) B2	.190‖
Joliet,Ill. A7	.187†
KansasCity,Mo. S5	.192**
Kokomo,Ind. C16	.189†
Minnequa,Colo. C10	.192**
Pittsburg,Calif. C11	.210†
Rankin,Pa. A1	.187†
S.Chicago,Ill. R2	.187**
Sterling,Ill.(7) N15	.192

WIRE, Merchant Quality 6 to 8 gage

	An'ld Galv.
Ala.City,Ala. R2	.9.00 9.55**
Aliquippa J5	.8.65 9.325‖
Atlanta(48) A11	.9.00 9.75*
Bartonville(48) K4	9.85 19.90
Buffalo W12	.9.00 9.55†
Chicago W13	.9.00 9.55**
Cleveland A7	.9.00 ....
Crawfordsville M8	9.10 9.80††
Donora,Pa. A7	.9.00 9.55†
Duluth A7	.9.00 9.55†
Fairfield T2	.9.00 9.55
Houston(48) S5	.9.25 9.80**
Jack'ville,Fla. M8	9.10 9.80‡‡
Johnstown(48) B2	9.00 9.675‖
Joliet,Ill. A7	.9.00 9.55†
KansasCity(48)S5	9.25 9.80**
Kokomo(48) S16	.9.10 9.65†
LosAngeles B3	.9.95 10.625‖
Minnequa C10	.9.25 9.80**
Monessen(48) P7	.8.65 9.35‖
Palmer,Mass. W12	.9.30 9.85†
Pitts.,Calif. C11	.9.95 10.50†
Rankin,Pa. A7	.9.00 9.55†
S.Chicago R2	.9.00 9.55**
S.SanFran. C10	.9.95 10.50**
Spar'wsPt.(48)B2	9.10 9.775‖
St'ling(37)(48)N15	.9.10 9.80
Struthers,O. Y1	.9.00 9.65‡
Worcester,Mass.A7	9.30 9.85†

Based on zinc prices of: *13.50c. †5c. ‖10c. ‡Less than 10c ††10.50c. ‡‡11.10c. **Subject to zinc equalization extras.

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in. larger 12.85 7/16 in. and smaller by 6 in. and shorter: 15% off list.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent: heavy hex nuts 1⅛ in. through 1½ in. tapped S threads, add 10 per cent.)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Hot Galvanized and Zinc Plated:

Packaged	39.25
Bulk	46

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	39.25
*Bulk	46

*Hot galvanized or zinc plated lag bolts only—for package or bulk quantities use applicable list less bulk discounts.

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged	+55
Bulk	+16

Flat Head Cap Screws:

¾ in. and smaller, 6 in. and shorter:	
Packaged	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam., 6 in. and shorter:	
Packaged	+ 5
Bulk	19
Through 1 in. diam., longer than 6 in.:	
Packaged	+29

HEXAGON NUTS: American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	39.25
Bulk	46

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over.)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St. Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.12
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2½	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....

TIE PLATES

Fairfield,Ala. T2	.6.875
Gary,Ind. U5	.6.875
Lackawanna,N.Y. B2	.6.875
Minnequa,Colo. C10	.6.875
Seattle B3	.7.025
Steelton,Pa. B2	.6.875
Torrance,Calif. C11	.7.025

JOINT BARS

Bessemer,Pa. U5	.7.25
Fairfield,Ala. T2	.7.25
Joliet,Ill. U5	.7.25
Lackawanna,N.Y. B2	.7.25
Minnequa,Colo. C10	.7.25
Steelton,Pa. B2	.7.25

AXLES

Ind.Harbor,Ind. S13	.9.125
Johnstown,Pa. B2	.9.125

SCREW SPIKES

Lebanon,Pa. B2	.15.10

TRACK BOLTS, Untreated

Cleveland R2	.15.35
KansasCity,Mo. S5	.15.35
Lebanon,Pa. B2	.15.35
Minnequa,Colo. C10	.15.35
Pittsburgh S44	.15.35
Seattle B3	.15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	.10.10
Ind.Harbor,Ind. I-2, Y1	.10.10
KansasCity,Mo. S5	.10.10
Lebanon,Pa. B2	.10.10
Minnequa,Colo. C10	.10.10
Pittsburgh J5	.10.10
Seattle B3	.10.60
S.Chicago,Ill. R2	.10.10
Struthers,O. Y1	.10.10
Youngstown R2	.10.10

FOOTNOTES

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga. 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3⅛ in., and smaller rounds and 2½ in. and smaller hexagons; 9.625c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	43.50
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	46.75
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	45.00
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	49.50
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	57.25
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	76.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	84.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	62.25
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 Cb-Ta	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	75.25
403	....	....	26.75	....	29.75	31.50	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	26.75	31.00	29.75	31.50	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	38.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	42.00
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels, Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates—Carbon Base 5%	10%	15%	20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.105
18.25	4.25	1	4.75	...	T-4	2.545
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	2	5	...	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....

Other U. S. Districts	Basic	No. 2 Foundry	Malle-able	Besse-mer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
Port Colborne, Ont. A25	65.00	65.00	65.50	66.00
Sault Ste. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade. 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%. Foundry grade, 1.75% or under, deduct 50c.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
Port Colborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb orders. Prices will vary with total weight of the order. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS			STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.85	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	9.50	10.26	10.06	11.25	9.65	11.70	16.38	9.85	9.60	11.10
Birmingham	8.46	10.20	10.59	9.45	8.26	13.14	16.65	8.47	8.41	10.05
Boston	9.90	10.40	11.52	12.40	10.05	13.35	16.59	10.50	9.83	11.85
Buffalo	9.30	10.05	11.80	11.70	9.45	11.45	16.30	9.90	9.40	11.80
Charlotte, N. C.	9.95	11.22	10.55	11.35	10.00	12.68	....	10.20	9.95	11.75
Chicago	9.22	10.20	10.70	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	9.38	10.26	10.75	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	9.22	10.66	10.92	11.51	9.33	11.25	16.06	9.96	9.30	11.59
Dallas	9.07	9.88	11.75	10.63	8.48	12.98	16.95	8.71	8.31	9.68
Detroit	9.48	10.46	11.05	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	8.67	9.48	11.35	10.23	8.08	13.10	16.55	8.31	7.91	11.57
Indianapolis	9.66	10.64	11.14	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10.35	11.20	12.10	12.40	10.25	14.20	17.35	10.45	10.30	12.30
Memphis, Tenn.	9.63	10.35	10.80	11.29	9.48	12.70	16.53	9.67	9.32	11.18
Milwaukee	9.36	10.34	10.84	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	9.57	10.55	11.05	11.74	9.57	11.00	16.30	9.92	9.41	11.70
Newark, N. J.	9.81	10.34	11.54	12.37	10.05	13.25	16.40	10.35	9.79	11.82
New York	10.07	10.78	11.35	12.37	10.44	13.25	16.40	10.90	10.22	11.82
Philadelphia	9.50	10.00	10.66	11.25	9.65	11.95	16.38	9.85	9.60	11.10
Pittsburgh	9.22	10.53	11.68	11.49	9.22	11.25	15.95	9.57	9.06	11.35
Portland, Oreg.	10.40	12.25	12.35	12.40	10.40	16.65	17.85	11.00	10.55	12.70
St. Louis	9.42	10.58	11.08	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	9.57	10.24	11.39	11.74	9.57	11.49	16.54	9.92	9.41	11.70
San Francisco	10.65	11.65	11.75	12.70	10.55	15.10	17.25	11.10	10.80	12.95
Seattle	11.35	12.45	13.40	12.80	10.80	16.20	17.85	11.50	10.95	13.60
Spokane, Wash.	11.20	12.30	13.25	12.65	10.65	16.20	17.85	11.35	10.80	13.45

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ¼ in. x 1 in.; hot rolled carbon bars, rounds, ⅝ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plate, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hitchins, Olive Hill, Ky., Athens, Troup, Tex., Clearfield, Curwensville, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo.; Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., Frostburg, Md., $133; Templeton, Pa., $135; Salina, Pa., $138; Niles, Ohio, $139; Lehi, Utah, $1.75.

Super-Duty: Ironton, Ohio, St. Louis, Mexico, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Frostburg, Md., $200; Stevens Pottery, Ga., $210; Troup, Tex., $215; Lehi, Utah, $263.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Hawstone, Thompsontown, Pa., Ensley, Ala., Portsmouth, Ohio, St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Pa., $163; E. Chicago, Ind., Joliet, Ill., $168; Cannon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $133; Philadelphia, Clearfield, Pa., $138; Warren, Ohio, $148.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Johnstown, Pa., Vandalia, Mo., $97; Chester, New Cumberland, W. Va., Freeport, Vanport, Merrill Station, Pa., Wellesville, Irondale, New Salisbury, Ohio, $100; Clearfield, Pa., Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120; Lehi, Utah, $175.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $250; Danville, Ill., $253; Fords, N. J., Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., Frostburg, Md., $260; Troup, Tex., $265.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $320; Troup, Tex., Fords, N. J., Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $360; Troup, Tex., Fords, N. J., Philadelphia, $365.

Tar Bonded Brick (per ton)

Dolomite: Nario, Ohio, $87.50. Dolomite-Magnesite: Nario, Ohio, $109.50. Magnesite: Nario, Ohio, $128.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310; Reesdale, Pa., $355.

Runners (per 1000)

Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234; Reesdale, Pa., $245.

Dolomite (per ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Nario, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines, Chewelah, Wash., $46; minus ⅝ in. grains bulk, Luning, Nev., $46; ⅝ in. grains with fines (periclase), Baltimore, $73, Pascagoula, Miss., $90.

*—9 in. x 4½ x 2.50 straights.

Ores

Lake Superior Iron Ore

(Prices effective for the 1961 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi nonbessemer	$11.45
Mesabi bessemer	11.60
Old Range nonbessemer	11.70
Old Range bessemer	11.85
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1961; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	25.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian (lump), 68.5%, f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$15.00-15.75*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75
48% no ratio	24.00-26.00†

Turkish

48% 3:1	35.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.40

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$3.00-3.50
60-65%	3.60-4.00

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:	
Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40
Bar Mill Brands:	
Carbon	5.40
Alloy	8.05
Bars, Reinforcing	5.30
Structural Shapes:	
Standard carbon	5.50
Angles & zees	5.40
Plates, Carbon:	
Sheared	5.45
Universal mill	5.10
Sheets & Coils, Hot Rolled:	
Carbon sheet	4.95
Carbon strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon sheet	6.35
Carbon strip:	
(0.080 and lighter)	6.35
(0.081 and heavier)	6.35
Sheets & Coils, Galvanized:	
Standard quality	6.70
Culvert quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field grade	9.00
Electrical grade	10.15
Sheet Piling	6.15
Skelp	4.70
Rails, Heavy	5.55
Rails, Light	5.70
Joint Bars	6.55
Tie Plates	6.35
Grinding Balls (3 in. diam.)	7.00
Tin Mill Products	(Per base box; 100 lb base wt)
Coke tin plate (1.25 lb pot yield)	$10.60
Electrolytic tin plate (0.25 lb coating)	9.10
Black plate	8.30
Nails, Wholesale:	
Carload lots	Col. 110

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $30-$33, contract; Mexican, all rail, duty paid, $29-$29.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	7.50††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	27.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe	36.75, ton deld. east of Mississippi.
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	37.80
Bronze powder, 90/10	55.80
Copper, all types	15.00*
Lead	7.50*
Manganese, 500 lb and up	25.00*
Nickel, all types	0.78-1.06
Nickel-Silver	54.70
Solder	7.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	23.20
Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5%, below 5 microns	2.32
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

	Price per net ton
Beehive Ovens	
Connellsville, Pa. furnace	$14.75-15.25
Connellsville, Pa. foundry	18.00-18.50
Oven Foundry	
Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
New Haven, Conn., ovens	31.00
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.75
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.60	$5.65	$5.55	$5.45	$5.75
Bar Size Angles	5.85	5.90	5.80	5.70	6.00
Structural Angles	5.65	5.70	5.60	5.50	5.80
I-Beams	5.60	5.65	5.55	5.45	5.75
Channels	5.60	5.65	5.55	5.45	5.75
Plates (basic bessemer)	5.55	5.60	5.50	5.40	5.70
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	23.90	23.95	23.85	23.55	25.30
Barbed Wire (†)	6.20	6.15	6.05	5.90	6.25
Merchant Bars	6.15	6.20	6.10	6.00	6.30
Hot-Rolled Bands	5.95	6.00	5.90	5.80	6.10
Wire Rods, Thomas No. 5 (Niederrhein)	5.80*	5.90	5.75	5.75	6.00
Wire Rods, O.H., No. 5 (Niederrhein)	6.00*	6.10	5.95	5.95	6.20
Bright Common Wire Nails (‡)	7.15	7.20	7.10	7.00	7.30

†Per 82 lb net reel. ‡Per 100-lb keg, 20d nails and heavier. *Except Boston.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.	
Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per ton bulk, f.o.b. cars or trucks, plant.	
Ammonium sulfate, regular grade	$32.00

Tin Plate Can Shipments Slip Slightly in April

Shipments of tin plate cans in April totaled 371,442 tons vs. 373,835 in March, reports the U. S. Census Bureau. The total for the first four months this year was 1,326,458 tons against 1,286,085 in the same 1960 period. The number of base boxes of tin plate consumed in April was 8,134,093 vs. 8,176,461 in March.

A total of 2936 tons of aluminum cans was shipped in April vs. 2894 tons in March. The total for the first four months of the year was 11,923 tons against 6471 in the same 1960 period.

Color Coded Rigid Steel Conduit Is Introduced

Seeking to increase its share of the electrical conduit market, National Electric Div. (Ambridge, Pa.), H. K. Porter Company Inc., has introduced color coded, rigid steel conduit.

Like Sherarduct conduit previously marketed by the company, it's protected against corrosion by Sherardizing, a galvanizing process in which zinc is alloyed to the steel walls and threaded ends. It's also dipped in acid resisting MVC-1 polyvinyl, to which color has been added. Then it's moved through ovens, where the finish is baked dry and hard.

Company officials predict the product will be widely used in new plants. Reason: Color coding helps maintenance men extend or relocate electrical lines, identify their voltage (a safety feature), and distinguish them from other types of piping.

The product is available in five standard colors (red, blue, orange, green, and yellow), special colors, and diameters of ½ in. through 6 in. Its price is 5 to 10 per cent above that of uncolored Sherarduct conduit—5 per cent higher on large orders of standard colors, up to 10 per cent more on smaller orders and special colors.

A steel plant that recently bought 1.5 million lb of color coded Sherarduct figures it saved $25,000 to $30,000 on the first 500,000 lb it installed through elimination of on-site painting.

Commenting on the market outlook for rigid steel conduit, S. C. Powers, National Electric's general manager, noted that prices had declined by 13 per cent since Mar. 1, 1960. They'll go up 5 per cent on July 1, he said, because producers are rescinding a special discount to jobbers that has been in effect since April.

"We can't see any evidence of a significant upturn," he declared. "We expect demand for conduit in the second half to be about the same as it has been in the first half."

Plates . . .

Plate Prices, Page 100

Most platemakers expect a dip in demand over the next few weeks, largely because of mass vacations at metalworking plants. A number of tank and boiler makers will be down at least two weeks, and some may be closed longer since the market is not under great pressure for deliveries.

Relatively little new railroad tonnage is developing. Ship requirements are being bolstered by a fair amount of Navy work, however. Some of this had been deferred for several weeks. New pipeline business continues to be disappointing. An unstated tonnage of plates is involved in an award of 399,000 ft of 16, 20, and 24 in. concrete cylinder water supply line for Skagit County (Wash.) PUD, Mt. Vernon, Wash.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 101 & 102

While sheets are the most active of all the major steel products, mill shipments are relatively prompt—on hot rolled running two to three weeks, cold rolled two to five weeks, galvanized six to eight weeks, and specialties (such as electrical and enameling sheets) in about 30 days.

Automotive tonnage demand is already being adversely affected by the approach of the vacation period and model changeover schedules. A large Eastern automotive stamping firm plans to close down June 28, reopening July 10. Another plant will be closed for four weeks—the last two weeks in July and the first two of August. Stampers in other lines will be down from two to three weeks over the vacation period.

The mills now hold a substantial portion of July sheet tonnage. Some newly booked automotive orders won't be delivered until late July, apparently being for the 1962 models. Galvanized sheet is the only flat rolled product that's in August delivery. Grain bins still account for a big slice of current galvanized demand.

No Special Extra Charged On Crucible's D-H Steels

Now you can buy electric furnace and open hearth specialty steels vacuum treated in the Dortmund-Horder unit at the Midland (Pa.) Works of Crucible Steel Co. of America, Pittsburgh. J. H. Buerger Jr., director of sales, reports several thousand tons of D-H steels have been produced.

Mr. Buerger said it was Crucible's intention to apply only the usual quality extras to the D-H steels. Typical qualities requiring no additional premium for D-H processing would be aircraft quality, bearing quality, ball and roller quality, gun quality.

Steel Bars . . .

Bar Prices, Page 100

Shrinking automotive requirements, due to model changeovers scheduled to start next month, are reported by carbon bar producers. The development, coupled with curtailed general demand prior to vacation shutdowns of metalworking plants, is reflected in a noticeable slump in orders. The June movement, however, is expected to be close to that in May.

Cold finished bar tonnage this month about equaled that in May. Consumers are asking the redrawers for prompt shipments. They are doing little forward buying.

Distributors . . .

Prices, Page 105

Major steel service center operators are making adjustments in price schedules. Reductions are predominant in most districts, especially in the Southwest. Price instability is noted particularly in reinforcing bars and stainless steels.

Business is expected to dip in July due to seasonal factors. Bookings in the last several weeks, however, have been steady and in fairly good volume.

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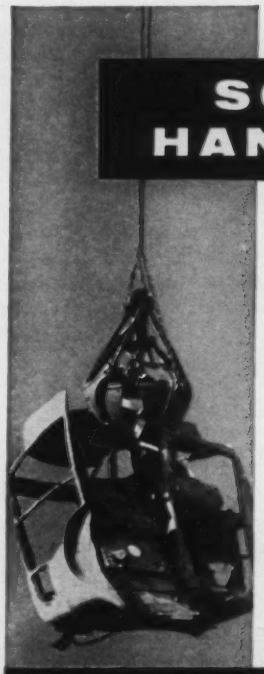

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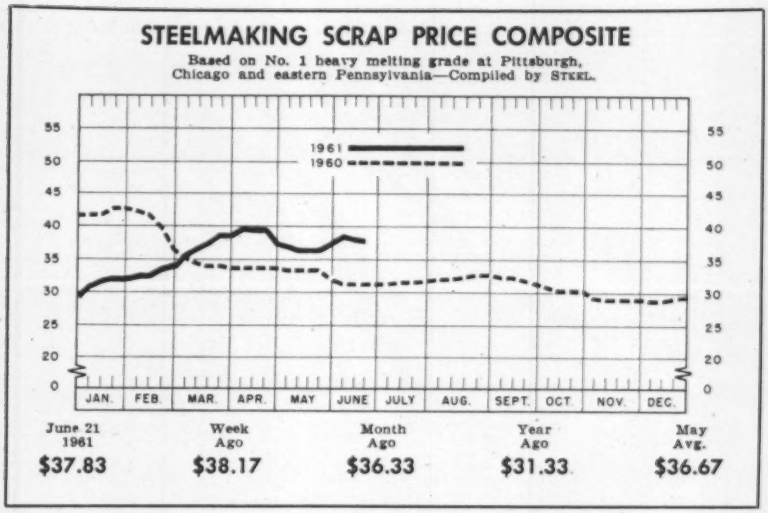

Scrap Slipping in Seasonal Letdown

STEEL's index on No. 1 heavy melting grade declines another 34 cents a ton to $37.83. Mill buying tends to dry up as steel operations slowly fall. Exports are less active

Scrap Prices, Page 110

● **Chicago**—The dip in the district steelmaking rate and the prospect of further reduction in July have resulted in a softer scrap market. Most leading steelmaking grades are down $1 a ton. No. 2 bundles, however, dropped $2 with a mill purchase at $22. Observers see no strength returning to the market until late July or August when steel demand is expected to turn upward.

● **Philadelphia**—Despite a tapering off in export demand, domestic scrap prices are unchanged. Collections of yard and industrial scrap are off, and district consumption, though light, remains steady. Following an especially heavy export movement from this port in May (around 100,000 tons), a decline in shipments is expected this month and next. The bulk of the export tonnage has been going to Japan.

● **Cleveland**—The market is in the dull period just prior to the entering of bids on monthend industrial scrap lists. They are expected to be smaller for July due to automotive curtailments. Steelmaking operations have been sliding the last three weeks and are not likely to flatten out until after the Fourth of July slump. Not much new mill buying is anticipated until late next month. Meanwhile, prices are unchanged, but lack a test.

● **Pittsburgh** — Despite generally higher prices paid for railroad scrap recently (brokers' bids were up $1 to $2 a ton), market sentiment is weaker. Steelmaking operations are leveling off, and the mills are showing no buying interest. Bidding on July factory bundles will be largely speculative.

● **New York**—The maritime strike has not noticeably disrupted export shipments of scrap from this port. Brokers' buying prices are unchanged, being supported chiefly by exports.

● **Detroit**—The market is quiet; only small lot trading is reported. Exports have dwindled, and the feeling is that the prices on the No. 1 grades of scrap may drop off $1 or $2 a ton next month. A decline in prices for stainless scrap is expected.

● **Buffalo**—A rise of $1 a ton on rerolling rails to $62-$63 was the only change in scrap prices reported here last week. Demand for rerolling rails is strong. The scrap market in general is quiet. Mills won't resume buying until early next month, and dealers look for only limited tonnage orders at that time.

● **Cincinnati**—The market is untested, but it appears firm at recently established price levels. Area mills are expected to re-enter the market for July requirements. Industrial lists are expected to be smaller next month due to vacation curtailments and shutdowns for model changeover.

● **St. Louis**—The market is steady, and prices are unchanged. There's plenty of scrap available in the area. While little activity is expected over coming weeks because of vacation shutdowns, some market strengthening is likely to result from reviving interest by exporters.

● **Birmingham**—Except for prices on shoveling turnings, which were marked down $1 a ton to $20-$21, quotations held throughout the scrap list last week. Cast iron pipe shops are suspending for two week vacations.

● **Houston** — A major Texas steel mill has indicated it will offer lower prices when it re-enters the market for scrap. The market appears to have leveled off, though No. 1 bundles are quoted up $1 at $35-$36, and low phos plate and structurals are $1 higher at $45-$46.

In Baton Rouge and New Orleans, exporters have paid as high as $40 for No. 1 heavy melting steel, $35-$36 for No. 2 heavy melting, and $25-$26 for No. 2 bundles.

● **Tacoma, Wash.**—Domestic demand for scrap has improved. Two ships are listed for loading here with full scrap cargoes for June and July delivery to Japan. One local exporter is paying $1 above the market, or $45, for No. 1 heavy melting. No. 2 bundles are weak at $28.

● **Portland, Oreg.**—Exporters here quote No. 1 heavy melting at $44-$45, No. 2 heavy melting $41-$42, No. 2 bundles $31, electric furnace material $54, No. 1 cupola $42,

(*Please turn to Page* 115)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, June 21, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

June 21	$37.83
June 14	38.17
May Avg.	36.67
June 1960	31.33
June 1956	46.04

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	36.00-37.00
No. 2 heavy melting	29.00-30.00
No. 1 dealer bundles	36.00-37.00
No. 2 bundles	24.00-25.00
No. 1 busheling	36.00-37.00
No. 1 factory bundles	42.00-43.00
Machine shop turnings	13.00-14.00
Mixed borings, turnings	13.00-14.00
Short turnings	16.00-17.00
Cast iron borings	15.00-16.00
Cut structurals:	
2 ft and under	40.00-41.00
3 ft and under	37.00-38.00
Heavy turnings	27.00-28.00
Punching & plate scrap	41.00-42.00
Electric furnace bundles	43.00-44.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	34.00-35.00
Stove plate	34.00-35.00
Unstripped motor blocks	24.00-25.00
Clean auto cast	35.00-36.00
Drop broken machinery	45.00-46.00‡

Railroad Scrap

No. 1 R.R. heavy melt	39.00-40.00
Rails, 2 ft and under	50.00-51.00
Rails, 18 in. and under	51.00-52.00
Random rails	46.00-47.00
Angles, splice bars	45.00-46.00
Railroad specialties	42.00-43.00
Rails, rerolling	59.00-60.00

Stainless Steel Scrap

18-8 bundles & solids	180.00-185.00
18-8 turnings	105.00-110.00
430 bundles & solids	85.00-90.00
410 turnings	50.00-55.00

CHICAGO

No. 1 hvy. melt., indus.	*38.00-39.00*
No. 1 hvy. melt., dealer	*36.00-37.00*
No. 2 hvy. melting	*30.00-31.00*
No. 1 factory bundles	*41.00-42.00*
No. 1 dealer bundles	*37.00-38.00*
No. 2 bundles	*21.00-22.00*
No. 1 busheling, indus.	*38.00-39.00*
No. 1 busheling, dealer	*36.00-37.00*
Machine shop turnings	15.00-16.00
Mixed borings, turnings	17.00-18.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals, 3 ft	42.00-43.00
Punchings & plate scrap	43.00-44.00

Cast Iron Grades

No. 1 cupola	*42.00-43.00*
Stove plate	*37.00-38.00*
Unstripped motor blocks	*34.00-35.00*
Clean auto cast	*47.00-48.00*
Drop broken machinery	*47.00-48.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*40.00-41.00*
R.R. malleable	47.00-48.00
Rails, 2 ft and under	49.00-50.00
Rails, 18 in. and under	50.00-51.00
Angles, splice bars	44.00-45.00
Axles	58.00-59.00
Rails, rerolling	58.00-59.00

Stainless Steel Scrap

18-8 bundles, solids	185.00-190.00
18-8 turnings	105.00-110.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

BUFFALO

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	26.00-27.00
No. 1 bundles	31.00-32.00
No. 2 bundles	24.00-25.00
No. 1 busheling	31.00-32.00
Shovel turnings	17.00-18.00
Machine shop turnings	13.00-14.00
Cast iron borings	15.00-16.00
Low phos. structurals and plates, 2 ft and under	39.00-40.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	38.00-39.00
No. 1 machinery	45.00-46.00

Railroad Scrap

Rails, random lengths	42.00-43.00
Rails, 3 ft and under	48.00-49.00
Rails, rerolling	*62.00-63.00*
Railroad specialties	41.00-42.00

CLEVELAND

No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	24.00-25.00†
No. 1 factory bundles	39.00-40.00
No. 1 bundles	35.00-36.00
No. 2 bundles	23.00-24.00†
No. 1 busheling	35.00-36.00
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	30.00-33.00
Cut structurals, plate, 2 ft and under	39.00-40.00
Low phos. punchings & plate	37.00-38.00
Alloy free, short shovel turnings	18.00-19.00
Electric furnace bundles	37.00-38.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Charging box cast	26.00-27.00
Heavy breakable cast	28.00-29.00
Stove plate	36.00-37.00
Unstripped motor blocks	31.00-32.00
Brake shoes	37.00-38.00
Clean auto cast	47.00-48.00
Burnt cast	32.00-33.00
Drop broken machinery	48.00-49.00

Railroad Scrap

R.R. malleable	47.00-48.00
Rails, 2 ft and under	48.00-49.00
Rails, random lengths	44.00-45.00
Rails, 18 in. and under	49.00-50.00
Cast Steel	41.00-42.00
No. 1 railroad cast	48.00-49.00
Railroad specialties	43.00-44.00
Angles, splice bars	46.00-47.00
Rails, rerolling	55.00-56.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	*165.00-170.00*
18-8 turnings	*100.00-105.00*
430 clips, bundles, solids	*80.00-85.00*
430 turnings	15.00-25.00†

YOUNGSTOWN

No. 1 heavy melting	38.00-39.00
No. 2 heavy melting	25.00-26.00†
No. 1 busheling	38.00-39.00
No. 1 bundles	39.00-40.00
No. 2 bundles	25.00-26.00†
Machine shop turnings	14.00-15.00†
Shovel turnings	19.00-20.00†
Cast iron borings	19.00-20.00†
Low phos.	40.00-41.00
Electric furnace bundles	40.00-41.00

Railroad Scrap

No. 1 R.R. heavy melt.	40.00-41.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	28.50-29.50
No. 1 bundles	33.00-34.00
No. 2 bundles	20.00-21.00
No. 1 busheling	32.00-33.00
Machine shop turnings	9.00-10.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	12.00-13.00
Cast iron borings	11.00-12.00
Low phos. 18 in.	39.00-40.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Heavy breakable cast	28.00-29.00
Charging box cast	34.00-35.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	36.00-37.00
Rails, 18 in. and under	47.00-48.00
Rails, random lengths	41.00-42.00

ST. LOUIS (Brokers' buying prices)

No. 1 heavy melting	34.00
No. 2 heavy melting	28.00
No. 1 bundles	34.00
No. 2 bundles	24.00
No. 1 busheling	34.00
Machine shop turnings	13.00
Shovel turnings	16.00

Cast Iron Grades

No. 1 cupola	37.00
Charging box cast	34.00
Heavy breakable cast	32.00
Unstripped motor blocks	34.00
Clean auto cast	38.00
Stove plate	33.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00
Rails, random lengths	37.00
Rails, rerolling	52.00-53.00
Rails, 18 in. and under	43.00
Angles, splice bars	40.00†

PHILADELPHIA

No. 1 heavy melting	39.00-40.00
No. 2 heavy melting	35.00-36.00
No. 1 bundles	43.00
No. 2 bundles	25.00-26.00
No. 1 busheling	43.00
Electric furnace bundles	43.00
Mixed borings, turnings	17.00†
Shovel turnings	20.00
Machine shop turnings	14.00
Heavy turnings	25.00†
Structurals & plates	43.00-44.00
Couplers, springs, wheels	43.00
Rail crops, 2 ft & under	52.00-54.00

Cast Iron Grades

No. 1 cupola	40.00
Heavy breakable cast	40.00
Drop broken machinery	49.00-50.00†
Malleable	49.00†

NEW YORK (Brokers' buying prices)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	30.00-31.00
No. 2 bundles	20.00-21.00
Machine shop turnings	5.50-6.00†
Mixed borings, turnings	6.00-6.50†
Shovel turnings	7.00-8.00†
Low phos. structurals & plates	32.00-33.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	31.00-32.00

Stainless Steel

18-8 sheets, clips, solids	155.00-160.00
18-8 borings, turnings	70.00-75.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	28.50-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 1 busheling	28.50-29.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	40.00-42.00

DETROIT (Brokers' buying prices)

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	35.00-36.00
No. 2 bundles	23.00-24.00
No. 1 busheling	31.00-32.00
Machine shop turnings	10.00-11.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	12.00-13.00

Cast Iron Grades

No. 1 cupola	32.00-33.00
Mixed cast	30.00-31.00
Stove plate	27.00-28.00
Heavy breakable	26.00-27.00
Unstripped motor blocks	22.00-23.00
Clean auto cast	39.00-40.00

Stainless Steel Scrap

18-8 bundles & solids	170.00-175.00
18-8 turnings	70.00-75.00
430 bundles & Solis	70.00-75.00
430 turnings	*11.00-12.00*

BIRMINGHAM

No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	29.00-30.00
No. 1 bundles	35.00-36.00
No. 2 bundles	19.00-20.00
No. 1 busheling	38.00-39.00
Cast iron borings	10.00-11.00
Machine shop turnings	18.00-19.00
Shovel turnings	*20.00-21.00*
Bar crops and plates	43.00-44.00
Structurals & plate	42.00-43.00
Electric furnace bundles	38.00-39.00
Electric furnace:	
3 ft and under	36.00-37.00
2 ft and under	37.00-38.00

Cast Iron Grades

No. 1 cupola	42.00-43.00
Stove plate	42.00-43.00
Unstripped motor blocks	31.00-32.00
No. 1 wheels	34.00-35.00

Railroad Scrap

No. 1 R.R. heavy melt	37.00-38.00
Rails, 2 ft and under	46.00-47.00
Rails, random lengths	40.50-41.50
Angles, splice bars	42.00-43.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	35.00
No. 2 heavy melting	31.00-32.00
No. 1 bundles	*35.00-36.00*
No. 2 bundles	24.00
Machine shop turnings	11.00-12.00
Low phos. plate & structurals:	
3 ft	40.00
2 ft and under	*45.00-46.00*

Cast Iron Grades

No. 1 cupola	37.00-38.00
Heavy breakable	26.00-27.00
Foundry malleable	30.00-31.00
Unstripped motor blocks	31.00-32.00

Railroad Scrap

R.R. heavy melt. (3 ft)	*37.00-38.00*

LOS ANGELES

No. 1 heavy melting	38.00-40.00
No. 1 hvy melt (export)	40.00-42.00
No. 2 heavy melting	34.00-37.00
No. 2 hvy melt (export)	37.00-39.00
No. 1 bundles	39.00
No. 2 bundles	25.00
No. 2 bundles (export)	27.00-28.00
Machine shop turnings	15.00-17.00
Shovel turnings	15.00-17.00
Cast iron borings	16.00-17.00
Cut structurals and plate 1 ft and under	50.00-52.00

Cast Iron Grades

No. 1 cupola	44.00-47.00

Railroad Scrap

No. 1 R. R. heavy melt.	42.00

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	44.00-45.00
No. 2 heavy melting	*41.00-42.00*
No. 2 bundles	31.00
Shovel turnings	*18.00*
Electric furnace	*54.00*

Cast Iron Grades

No. 1 cupola	*42.00*
Heavy breakable	*38.00*
Unstripped motor blocks	39.00
Stove plate (f.o.b. plant)	37.00

SEATTLE (Prepared, f.o.b. car)

No. 1 heavy melting	44.00-45.00
No. 1 hvy (unprepared)	39.00
No. 2 heavy melting	41.00-42.00
No. 2 hvy (unprepared)	36.00
No. 2 bundles	31.00
Shovel turnings	*16.00-18.00*
Electric furnace	52.00

Cast Iron Grades

No. 1 cupola	42.00
Heavy breakable cast	39.00
Stove plate (f.o.b. plant)	37.00
Unstripped motor blocks	39.00

SAN FRANCISCO

No. 1 heavy melting	44.00**
No. 2 heavy melting	41.00**
No. 1 bundles	34.00**
No. 2 bundles	28.00**
Machine shop turnings	18.00
Mixed borings, turnings	18.00
Cast iron borings	18.00
Heavy turnings	18.00
Shovel turnings	18.00

Cast Iron Grades

No. 1 cupola	46.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting	31.00
No. 2 hvy melt, 2 ft & under	29.00
No. 1 bundles	31.00
No. 2 bundles	21.00
Mixed steel scrap	23.00
Mixed borings, turnings	12.00
Busheling, new factory: Prepared	31.00
Unprepared	25.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	32.00

*For export add $4 dock charge.
**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.

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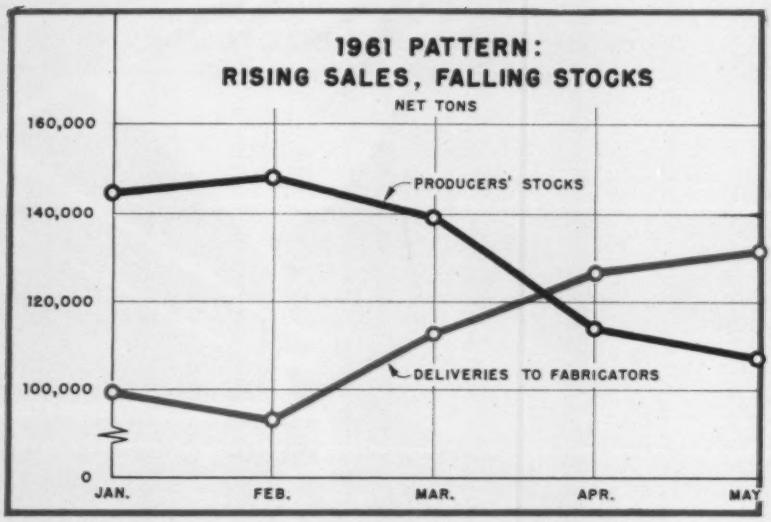
Labor Peace Key to Copper Price

Nonferrous Metal Prices, Pages 114 & 115

WATCH labor negotiations at Kennecott Copper Corp.'s Western properties during the next month for a clue to the copper price outlook. If the unions walk out, odds are good you'll see higher prices. If labor troubles are averted, the price should stabilize.

Here's why: Factors that disturbed the market during much of April and May have eased. First, the African situation, both in the Congo and Northern Rhodesia, is not causing the concern it did a few weeks ago. Second, heavy speculation in copper has pretty much disappeared. Third, scrap exports have eased, and prices are down, which means more raw material for the custom smelter (see Page 96).



• **Labor Situation Uncertain** — At this point, no one can guess what will happen at Kennecott. Its contract with the International Union of Mine, Mill & Smelter Workers expires at the end of this month. But it's unlikely that an agreement will be signed by then. And it will probably be the union that drags its feet.

Here's the story: The United Steelworkers of America's contract with Kennecott doesn't run out until July 31. And while Mine-Mill has more workers organized at Kennecott (47 per cent compared with 23 per cent for USW), the steelworkers are much stronger nationally. Insiders are convinced Mine-Mill will continue to work through the month of July on a day-to-day basis and pretty much toss the ball to USW.

Mine-Mill probably feels it must adopt this follow-the-leader procedure, say observers. It has been beset by financial troubles for several years. Charges that the union is Communist dominated have weakened its position. And Mine-Mill has lost ground in membership to rival unions, particularly the USW. Last year, members of the big local at the Bunker Hill Co.'s lead and zinc facilities at Kellogg, Idaho, voted to oust the union.

Facing these pressures, Mine-Mill can't afford to get less than the USW. So it's evidently adopting a "wait-and-see" position. The USW, likewise, would be delighted to show up Mine-Mill. So we might see some pretty fast jockeying for position. Some observers believe the union rivalry may be a greater threat to labor peace than the economic issues.

• **What USW Wants**—Major interest will be centered on what goes on at the bargaining table between USW and Kennecott. So far, USW demands include:

- A 32 hour workweek with 40 hours' pay.
- A hike in base pay (not spelled out yet) in excess of 8.5 cents an hour.
- More liberal vacation plan.
- A Supplemental Unemployment Benefits program.

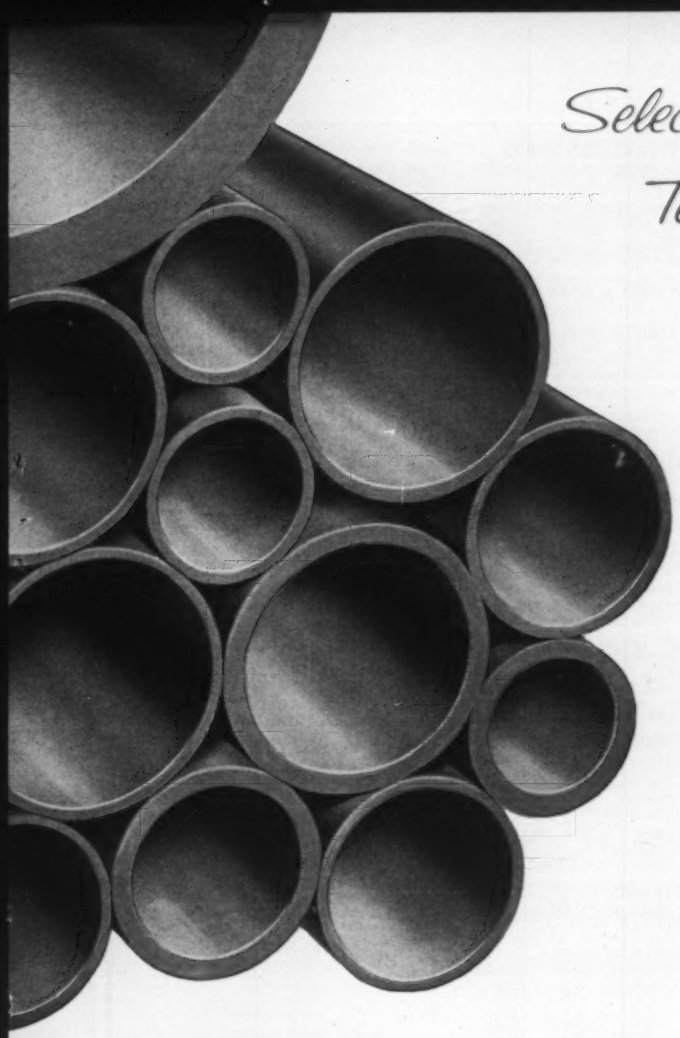
• **Copper Demand Good**—Though the pressures are off the copper price for a while, demand remains good. May domestic shipments of refined copper to fabricators, at 131,317 tons (see chart), were the best since June, 1959. Producer stocks fell to 106,982 tons, the lowest since last September.

Aluminum Price Falls

The price of aluminum extrusion billets tumbled officially on June 21 when Kaiser Aluminum & Chemical Corp., Oakland, Calif., lowered quotations on the 1000, 3000, and 6000 series.

The new price for extrusion billets in the most widely used 6063 alloy, for example, is 27.2 cents per pound.

Kaiser said the action was taken to "conform to market conditions . . . in certain areas." Price cutting, widespread in almost every line of aluminum products, has been especially severe in the extrusion market. Kaiser's action is official recognition of this situation.



Selection of finest raw materials

Testing every step of the way

Inspection to rigid standards

Assure 100% dependability for

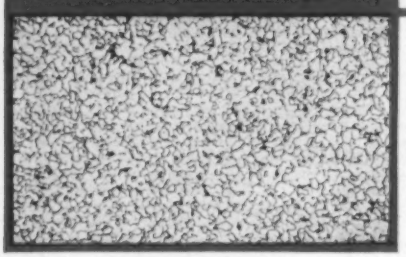
OHIO WELDED PRESSURE TUBING

You can be sure — doubly sure — of utmost tubing dependability when you specify Ohio Welded Pressure Tubing — *made by Ohio Seamless*. First, Ohio works to accepted industry standards — ASTM, ASME, and similar Federal and military specifications covering welded pressure tubing. Second, Ohio Welded Pressure Tubing is produced under a *continuous* process of quality control — not just a final test inspection to cull questionable material.

Carefully selected prime raw material is slit, edged, shaped and electric resistance welded on the most versatile and modern equipment in operation. At each and every step of the way Ohio Welded Pressure Tubing is under the scrutiny of Ohio's master tubemakers . . . making control tests at frequent intervals . . . testing random samples from each production order far beyond the limits of the usage involved.

For critical pressure piping applications . . . for condensers, heat exchangers, boilers and superheaters — in the range of sizes from ½ to 7½" OD and wall thicknesses from .028 to .375"— mark your prints "*Ohio Custom Made Welded Pressure Tubing.*" There is no equivalent.

Photographs show flare, flattening and crush tests performed continuously on every order. Non-destructive tests include air, water, magnetic, eddy current and visual inspection to insure 100% dependability.



Photomicrograph of polished and acid-etched surface shows perfect microstructure of normalized Ohio Welded Pressure Tubing. Weld area running down the center is now indistinguishable and tube has become, in every sense, weldless.

OHIO

OHIO SEAMLESS TUBE

Division of Copperweld Steel Company

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Representatives in principal cities. Check leading directories:
THOMAS', MacRAE'S, CONOVER-MAST, SWEET'S, FRASER'S.

A-4900A

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 29.00; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 95.5%, 32.50; Lone Star brand, 33.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 30.50-31.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.
Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55 per lb and up nom.

Copper: Electrolytic, 31.00 deld.; custom smelters, 31.00 nom.; lake, 31.00 deld.; fire refined, 30.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.50; chemical, 10.90; corroding, 10.90; St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-90 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $200-204 per 76 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $5.25 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 117.00.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.10-4.00.

Zinc: Prime Western, 11.50; brass special 11.70; intermediate, 11.70, East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 12.35; special high grade, 12.50 deld. Die casting alloy ingot No. 3, 13.75; No. 2, 14.25; No. 5, 14.00 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb; 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.25-26.00; No. 12 foundry alloy (No. 2 grade), 21.75-22.25; 5% silicon alloy, 0.60 Cu max, 23.50-24.00; 13 alloy, 0.60 Cu max., 23.50-24.00; 195 alloy, 24.75-25.75; 108 alloy, 22.25-22.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.25; grade 2, 22.00; grade 3, 21.00; grade 4, 20.00.

Brass Ingot: Red brass, No. 115, 32.00; tin bronze, No. 225, 41.25; No. 245, 35.75; high leaded tin bronze, No. 305, 36.00; No. 1 yellow, No. 405, 27.50; manganese bronze, No. 421, 31.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.955, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 36.35; l.c.l., 36.98. Weatherproof, 20,000-lb lots, 37.05; l.c.l., 37.80.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $16.50 per cwt; pipe, full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-114	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; length, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.00
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; 188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grades (AZ31B)
6.8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 24.50-25.00; No. 2 heavy copper and wire, 22.50-23.00; light copper 20.00-20.50; No. 1 composition red brass, 21.00-21.50; No. 1

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES d (Based on copper at 31.00c)		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	56.13b	50.61-51.36	....	57.32	27.00	27.00	26.25
Yellow Brass	49.27	35.77c	49.56	53.43	20.375	19.50c	18.50c
Low Brass, 80%	52.15	52.09	52.44	56.21	22.875	22.625	22.125
Red Brass, 85%	53.17	53.11	53.46	57.23	23.875	23.625	23.125
Com. Bronze, 90%	54.73	54.67	55.02	58.54	24.75	24.50	24.00
Manganese Bronze	57.71	51.27	61.54	....	19.25	19.00	18.25
Muntz Metal	51.94	47.25	....	....	19.125	18.875	18.375
Naval Brass	53.94	47.75	60.25	58.10	19.00	18.75	18.25
Silicon Bronze	61.39	60.58	60.68	79.80	26.375	26.125	25.375
Nickel Silver, 10%	64.83	67.16	66.91	....	25.25	25.00	12.625
Phos. Bronze, A-5%	76.97	77.47	76.72	78.90	28.50	28.25	27.25

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Free cutting. d. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 20.00-20.50; new brass clippings, 18.00-18.50; light brass, 15.00-15.50; heavy yellow brass, 16.00-16.50; new brass rod ends, 17.00-17.50; auto radiators, unsweated, 16.50-17.00; cocks and faucets, 17.50-18.00; brass pipe, 18.00-18.50.

Lead: Soft scrap lead, 7.25-7.50; battery plates, 3.00-3.25; linotype and stereotype, 8.50-8.75; electrotype, 8.00-8.25; mixed babbitt, 10.00-10.50.

Monel: Clippings, 23.00-23.50; old sheets, 22.00-23.00; turnings, 16.50-17.00; rods, 22.00-23.00.

Nickel: Sheets and clips, 52.00-54.00; rolled anodes, 52.00-54.00; turnings, 40.00; rod ends, 52.00-54.00.

Zinc: Old zinc, 3.00-3.25; new diecast scrap, 3.00-3.50; old diecast scrap, 1.75-2.00.

Aluminum: Old castings and sheets, 9.75-10.25; clean borings and turnings, 4.50-5.00; segregated low copper clips, 11.75-12.25; segregated high copper clips, 10.75-11.25; mixed low copper clips, 11.25-11.75; mixed high copper clips, 10.75-11.25.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 9.75-10.25; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 13.00-13.50; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.00; clean borings and turnings, 9.00-9.50; segregated low copper clips, 14.00; segregated high copper clips, 13.50; mixed low copper clips, 13.50; mixed high copper clips, 13.00-13.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 57.00; light scrap, 52.00; turnings and borings, 37.00.

Copper and Brass: No. 1 heavy copper and wire, 28.00; No. 2 heavy copper and wire, 26.25; light copper, 24.75; refinery brass (60% copper) dry copper content, 24.25-24.75.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 27.50-28.00; No. 2 heavy copper and wire, 25.50-26.00; light copper, 23.25-23.75; No. 1 composition borings, 22.50-23.50; No. 1 composition solids, 23.00-24.50; heavy yellow brass solids, 18.50-19.50; yellow brass turnings, 17.50-18.50; radiators, 19.00-20.00.

Plating Material

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 47.50; oval, 44.50; electrodeposited, 37.50; cast, 42.50; 5000-10,000 lb quantities.

Nickel: Depolarized, less than 500 lb, 109.00; 500-1999 lb, 102.00; 2000-4999 lb, 98.50; 5000-29,999 lb, 97.50; 30,000 lb, 96.50. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 500 lb, 146.00; 500-999 lb, 144.00; 1000-1999 lb, 142.00; 2000-9999 lb, 141.00; 10,000-19,900 lb, 140.00.

Zinc: Balls, 18.25; flat tops, 18.25; flats, 21.00; ovals, 20.25, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.50; 2000-5900 lb, 13.50; 6000-11,900 lb, 13.25; 12,000-22,900 lb, 13.00; 23,000 lb or more, 12.50.

Nickel-Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 500-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 2000 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 86.90; 100-600 lb, 77.20; 700-1900 lb, 74.50; 2000-9900 lb, 72.60; 10,000 lb or more, 71.30.

Stannous Chloride (Anhydrous): 100 lb, 145.40; 400 lb, 135.40; 800-19,900 lb, 114.10; 20,000 lb or more, 109.90.

Stannous Sulphate: Less than 50 lb, 152.80; 50 lb, 122.80; 100-1900 lb, 120.80; 2000 lb or more, 118.80.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page* 109)

heavy breakable cast $38, stove plate $37, unstripped motor blocks $39.

• **Los Angeles** — While dealers don't expect any change in the scrap market this month, some are predicting that price weakness will develop in July. The Japanese are pressing sellers for a $3 reduction on new commitments.

• **San Francisco**—Some light tonnage buying of No. 1 heavy melting steel has been done by a district mill at $44. That level was recently established for export sales.

Scrap Use During April Largest Since May, 1960

Consumption of ferrous scrap (on both monthly and daily average bases) during April was the highest since May, 1960, reports the U. S. Bureau of Mines. Use in the month was 4,667,000 gross tons vs. 4,449,078 the preceding month. Daily average consumption was 156,000 tons.

The total metallic charge (scrap and pig iron) in April was 8,987,000 gross tons, largest since June, 1960. It consisted of 52 per cent scrap and 48 per cent pig iron, unchanged for the eighth straight month.

Domestic consumers' stocks of scrap on Apr. 30 totaled 7,558,000 gross tons, down 2 per cent from the 7,689,881 tons held on Mar. 31, and the lowest inventory since Aug. 31, 1957. Stocks of pig iron held by consumers and suppliers at the end of April were off 4 per cent, being 3,040,000 tons vs. 3,177,847 at the end of March. The April total was the lowest since April, 1960. Pig iron stocks are not comparable with scrap stocks as 90 per cent of pig iron is charged into steelmaking furnaces in the hot metal state.

Wire . . .

Wire Prices, Pages 102 & 103

Price weakness in the wire market has broken out into the open. Ten days ago it became generally known that leading producers of wire rope had reduced their prices to jobbers by about 10 per cent. The cut amounts to around 3.5 cents per foot on general purpose and oil field rope.

Competition from imported rope has been severe in some areas. However, it's also reported that price easiness stems from the offering of low priced domestic rope made from imported rods.

In still another area of the wire market, it was learned last week that West Coast producers of spring wire for auto seats and furniture had quietly cut their prices about $10 a ton in recent weeks. The reduction was said to have been made partly to meet import competition. The move narrows the spread between prices quoted by Far West mills and those posted by Midwestern mills to about $9 a ton. It formerly was $19.

Wire buying is slackening as the

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For Sale

FOR SALE

Available at a good reduction under mill price steel sheets and plates, limited quantity only, range plates 3/8", 5/16", 1/4," 3/16", any width up to 60" maximum or decimal equivalent, sheets 7, 8, 9, 10, 11, 12, 13, and possibly 14 gauge up to 60" in width, specifications per your choosing from SAE 1005 to SAE 1050, plain, pickled dry, or pickled and oiled available, depending on specifications. Can also supply coils. All material from domestic manufacture off continuous mill. Exact sizes can be supplied. Must have complete specifications and delivery point so that proper quotations can be given. Prefer end-users, however, will accept serious inquiries from resellers. If interested, write:

Box 936, STEEL
Penton Bldg., Cleveland 13, Ohio

—FURNACES—SAVE AT LEAST 50%—
ARC MELTING
1000 lb. LECTROMELT, 250 KVA
2000 lb. SWINDELL, 1000 KVA
9' TOP CHARGE, 2000 KVA
INDUCTION
50 KW to 200 KW TOCCO Mtg. Units
100 KW AJAX Production Heat Unit
Universal Machinery & Equipment Co.
Box 873 FRanklin 3-5103 Reading, Pa.

Help Wanted

PLANT MANAGER WANTED with master mechanic or machinist experience for machinery factory in southwest employing about 80. Box 941, STEEL, Penton Bldg., Cleveland 13, Ohio.

WE CAN HELP YOU TO CONTACT high calibre men to fill specific jobs you have in mind.

Readers of STEEL include men of wide training and experience in the various branches of the metalworking industry. When you have an opportunity to offer, use the Help Wanted columns of STEEL.

vacation season nears. A few government orders are outstanding, including 2.5 million helical bed springs for the Army Quartermaster, Richmond, Va., and 1,969,000 linear feet of ½ in. transmission line for the Bureau of Reclamation, Denver.

Wire used for reinforcing is relatively more active than those grades going into industrial operations.

Stronger Mesh Grating Introduced by Blaw-Knox

Blaw-Knox Co., Pittsburgh, is introducing a closer mesh grating. Its load bearing capacity is increased 60 per cent through the use of 36 bars in each standard 2 ft width. The product is also available in 37 bars in each 2 ft wide panel and in other minimum bar sizes.

The grating is designed for utility applications and a wide variety of venting uses in other industries and the commercial building field. It's particularly suited for sidewalk openings. It's fabricated through an electroforging process, which provides one-piece construction of the bearing bars and crossbars which are twisted to provide a slightly rough, nonslip surface.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 106

Ford Motor Co. has contracted with the Koppers Co., Pittsburgh, for the rebuilding of a battery of 61 coke ovens at its Rouge Works near Detroit. Ovens will be constructed on the site of a battery which will be razed. The new battery will consist of 61 gas-gun type ovens to be underfired with blast furnace gas. Construction will be completed early next year. The Rouge plant has four coke batteries —220 ovens.

Island Creek Coal Co., Pittsburgh, announced last week it will reopen its No. 22 mine at Pine Creek, W. Va., July 10. The move is seen as reflecting increased demand for metallurgical coal. This will be the fifth mine to be reopened by Island Creek since May 1. It will initially produce about 1000 tons daily and employ about 70.

The coal industry will begin a two weeks vacation next week under the terms of the United Mine Workers' contract.

Crucible Announces Permanent Magnet

A permanent magnet, Alnico VIII, is being introduced by Crucible Steel Co. of America, Pittsburgh. It's claimed to have more than twice as much resistance to demagnetization as Alnico V, and it is higher in both coercive force and maximum energy product than Alnico VI or VII.

Alnico VIII is adaptable to these applications: Flat type speaker structures, permanent magnet cores for meters, magnetic separators, and the focusing of electron beams.

Pig Iron . . .

Pig Iron Prices, Page 105

Merchant pig iron demand is dragging and is expected to become more inactive in July when many consuming plants close for vacations. None of the casting shops is buying iron for inventory. On the average, buyers' stocks run to no more than ten days.

Competition from cast scrap seems to be increasing. More foundries are using more scrap in their melts at the expense of pig iron. Some German pig iron is being offered at prices around $61 to $63 a ton, Philadelphia. That range is under the domestic market, but is not as low as earlier offerings.

Rails, Cars . . .

Track Material Prices, Page 103

The Bessemer (Ala.) plant of Pullman-Standard Div., Pullman Inc., halted operations last week because of lack of orders. A standby crew is on hand. Employment exceeded 1300 at one time during the last several months. The plant has operated almost without interruption during the past four years, except for a three-month shutdown during 1958.

Orders have been placed by the Santa Fe Railroad for one hundred, 85 ft flatcars from the General American Transportation Corp., Chicago. A wholly owned subsidiary, the Santa Fe Trail Transportation Co., has ordered 150, forty ft refrigerator trailers from the Fruehauf Trailer Co., Kansas City, Mo. The trailers and 75 of the flatcars will be used in the transportation of fresh fruits and vegetables from California and Arizona points to Midwest locations.

Structural Shapes . . .

Structural Shape Prices, Page 100

Most structural fabricators are now anticipating active operations throughout the summer and early fall. However, price competition is keen, and some shops are out of the market.

Highway work is prominent in current demand, but there's a fair diversity of other public work before the market, as well as commercial and private construction. New England fabricators are adding substantial bridge tonnage to their backlogs. Some private construction in the area is being delayed. Estimates are out for an office building at Hartford, Conn., involving 2500 tons, but private work, for the most part, lags.

Among recent prominent contracts is the award of the $8 million library at Notre Dame University, South Bend, Ind. It went to the American Bridge Div., Pittsburgh, U. S. Steel Corp. About 2800 tons of steel are involved.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

8000 tons, 37 story office building, through George A. Fuller Co., 330 Madison Ave., New York, to Bethlehem Steel Co., Bethlehem, Pa.

2800 tons, 13 story library, University of Notre Dame, South Bend, Ind., to American Bridge Div., Pittsburgh, U. S. Steel Corp.; Ellerbe & Co., St. Paul, Minn., architect and engineer; project will cost $3 million.

2460 tons, paper mill, Federal Paper Board Co., Versailles, Conn., to Topper & Griggs (Bethlehem Fabricators Inc.), Hartford, Conn.; W. J. Megin Inc., Naugatuck, Conn., general contractor.

1200 tons, engineering building No. 202, National Bureau of Standards, Gaithersburg, Md., through Paul Tishman, general contractor, to Lehigh Structural Steel Co., Allentown, Pa.

950 tons, Nazareth High School, Brooklyn, N. Y., through Tweedy Engineering Co., Jamaica, N. Y., to Lehigh Structural Steel Co., Allentown, Pa.

640 tons, six story office building, Pickman Realty Corp., 118 Queens Boulevard, Forest Hills, N. Y., to Schacht Steel Construction Inc., New York.

560 tons, Motel City Unit C, 507-15 W. 42nd St., New York, through Euclid Contracting Corp., to Schacht Steel Construction Inc., New York.

480 tons, Northwest Natural Gas Co., office and service center, Portland, Oreg., to Lewis & Riffle, Portland; A. V. Peterson Co., Portland, general contractor, low at $1,422,697.

STRUCTURAL STEEL PENDING

5755 tons, towers, transmission line, Colorado River storage project, Navajo, Coconino, and Apache Counties, Arizona, and San Juan County, N. Mex.; bids July 17 to the U. S. Bureau of Reclamation, Denver.

4000 tons, state office building, Trenton,

N. J.; Bethlehem Steel Co., Bethlehem, Pa., is low bidder.

2500 tons, office building, Phoenix Mutual Life Insurance Co., Hartford, Conn.; George A. Fuller Co., New York, general contractor.

595 tons, including 280 tons of joists, General Motors parts warehouse, North Brunswick, N. J.; bids closed June 13.

450 tons, Belmont Filter Works, Philadelphia, bids closed June 20; also, 2200 tons of reinforcing bars and 270 tons of large diameter pipe.

400 tons, addition to reactor installation, Arco, Idaho; bids in to Atomic Energy Commission.

365 tons, two span, composite plate-girder bridge, Main Street, Hartford, Conn.; Mariani Construction Co., New Haven, Conn., low bidder; also, 520 tons of reinforcing bars, and 280 tons of sheet piling.

360 tons, angles, Military Industrial Supply Agency, Navy, Philadelphia; bids July 5; also, 145 tons of steel sheets, bids June 30.

320 tons, gates and guides, Wanapum Dam, Columbia River; Pacific Car & Foundry Co., Seattle, is low bidder.

213 tons, wide flange, Grade M, Military Industrial Supply Agency, Navy, Philadelphia; bids June 28.

200 tons, high school, Anchorage, Alaska; bids in.

150 tons, approaches to Paine Air Field, Everett, Wash.; bids in.

Unstated, two 60 ft antenna towers, Gulkana, Alaska; also structures; J. B. Warrack Co., Anchorage, Alaska, low bidder at $268,219 to the Federal Aviation Agency, Anchorage.

REINFORCING BARS . . .

REINFORCING BARS PLACED

3000 tons, Penn Towers Apartment, Philadelphia, to the American Steel Engineering Co., Philadelphia.

120 tons, Second and James St. Garage, Seattle, to Pacific Coast Div., Seattle, Bethlehem Steel Co.; Brazier Construction Co., Seattle, general contractor.

REINFORCING BARS PENDING

2200 tons, Belmont Filter Works, Philadelphia, bids closed June 20; also, 450 tons of structurals and 270 tons of large diameter pipe.

250 tons, 642 ft Idaho State overpass, Payette County; Neilsen & Miller, Twin Falls, Idaho, low at $595,757.

180 tons, reflooring Waldo Hancock Bridge, Prospect-Verona, Maine; bids July 5 to Augusta, Maine.

100 tons, two bridges, Windham, N. H.; bids July 5 to Concord, N. H.

Unstated, four story hospital building, U. S. Veterans' Administration Center, Ft. Harrison, Mont.; Henry George & Sons, Spokane, Wash., low bidder at $3,975,000.

Unstated, Montana State 118 ft dual interchange, Lewis & Clark County; McNutt & Bauline, Eugene, Oreg., low bidder at $3,788,848 (involving heavy road work).

PLATES . . .

PLATES PLACED

153 tons, hull plates, Military Industrial Supply Agency, Navy, Philadelphia, to Kaiser Steel Corp., New York.

PLATES PENDING

500 tons, also reinforcing bars, 39,999 ft of 16, 20, and 24 in. concrete cylinder water supply pipe, Skagit County P.U.D., No. 1, Mt. Vernon, Wash.; general contract to Harold Kaeser Co., Seattle, low at $596,796.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Brazil, 180 locomotives for use on eight railroads in that country, to the General Electric Co., for construction at Erie, Pa.

RAILROAD CARS PLACED

Erie-Lackawanna, 100 piggyback flatcars, to General American Transportation Co., Chicago.

Shippers Car Line, eighty, 100 ton aluminum covered hopper cars, to the Berwick, Pa., plant of ACF Industries Inc. The cars will be leased by Kaiser Aluminum & Chemical Corp.

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Don't blindfold him!

THE MAN in this picture is a cancer research scientist. The device he is using looks like something out of science-fiction—but actually, it's an electron microscope. It shows him the sub-microscopic detail of a cancer cell—magnified 100,000 times. *The cost of one electron microscope is $35,000.*

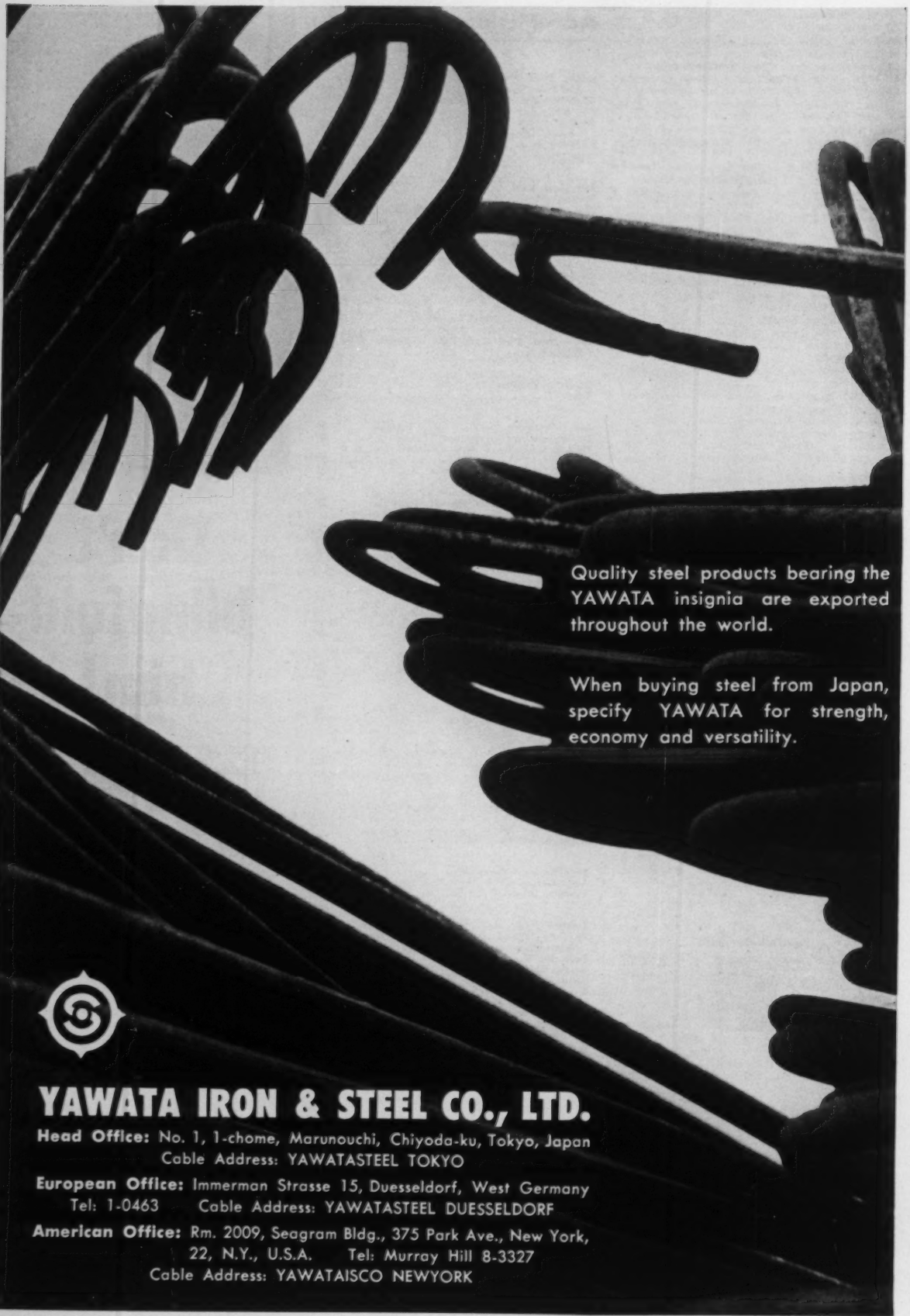
Some of the equipment needed for cancer research, and purchased with American Cancer Society funds, is even more expensive.

The American Cancer Society grants millions of dollars for research to some 1300 scientists who are at this moment working to find the cause of cancer—and ultimately, ways to prevent cancer.

Your help is needed to enable the American Cancer Society to continue this support.

Don't blindfold cancer research. Give to it. Send your contribution now to CANCER, c/o your local post office.

AMERICAN CANCER SOCIETY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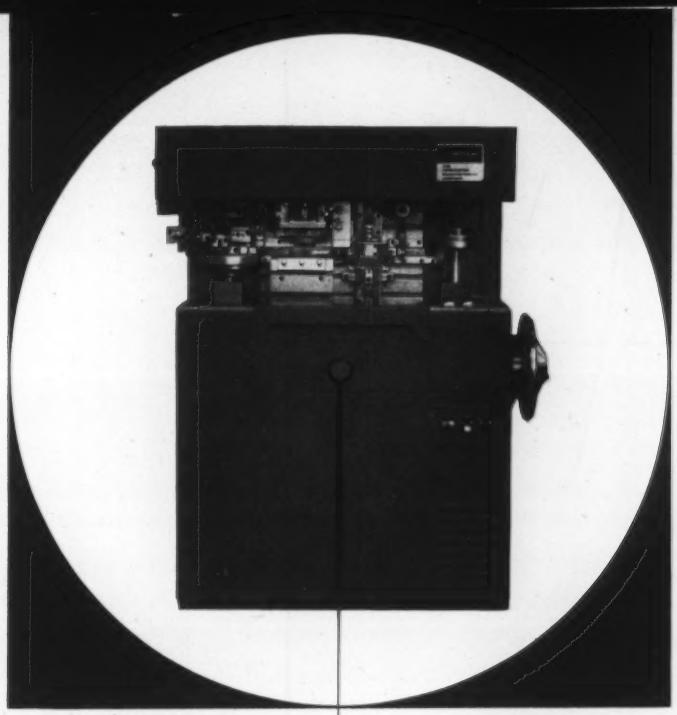
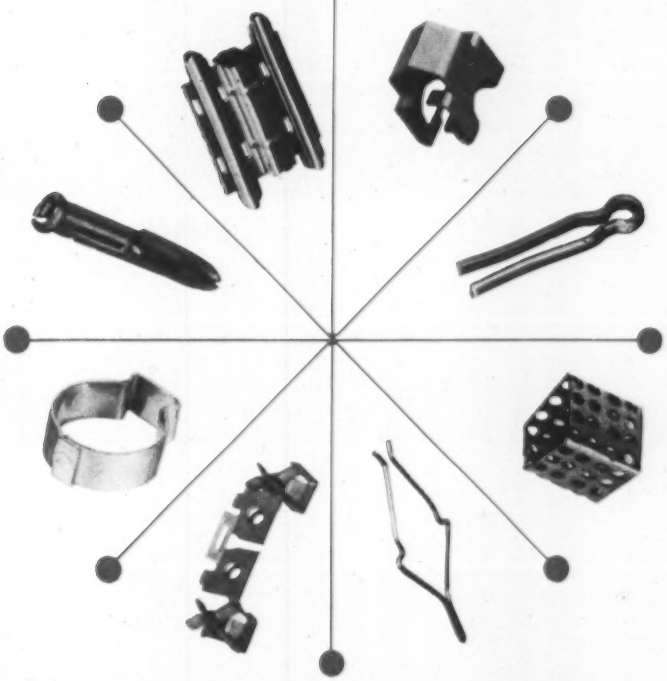


This is the machine

These are its products



If you recognize parts like these you should be familiar with this machine

The machine is a **Verti-Slide.** It can press, punch, and form in one continuous operation — and in addition, weld, thread roll, swage and do other secondary work. If you now use or supply small parts, made from wire or strip stock, the **Verti-Slide** method can offer you many dramatic production advantages. To evaluate your need write today for our **Parts Cost Package.**

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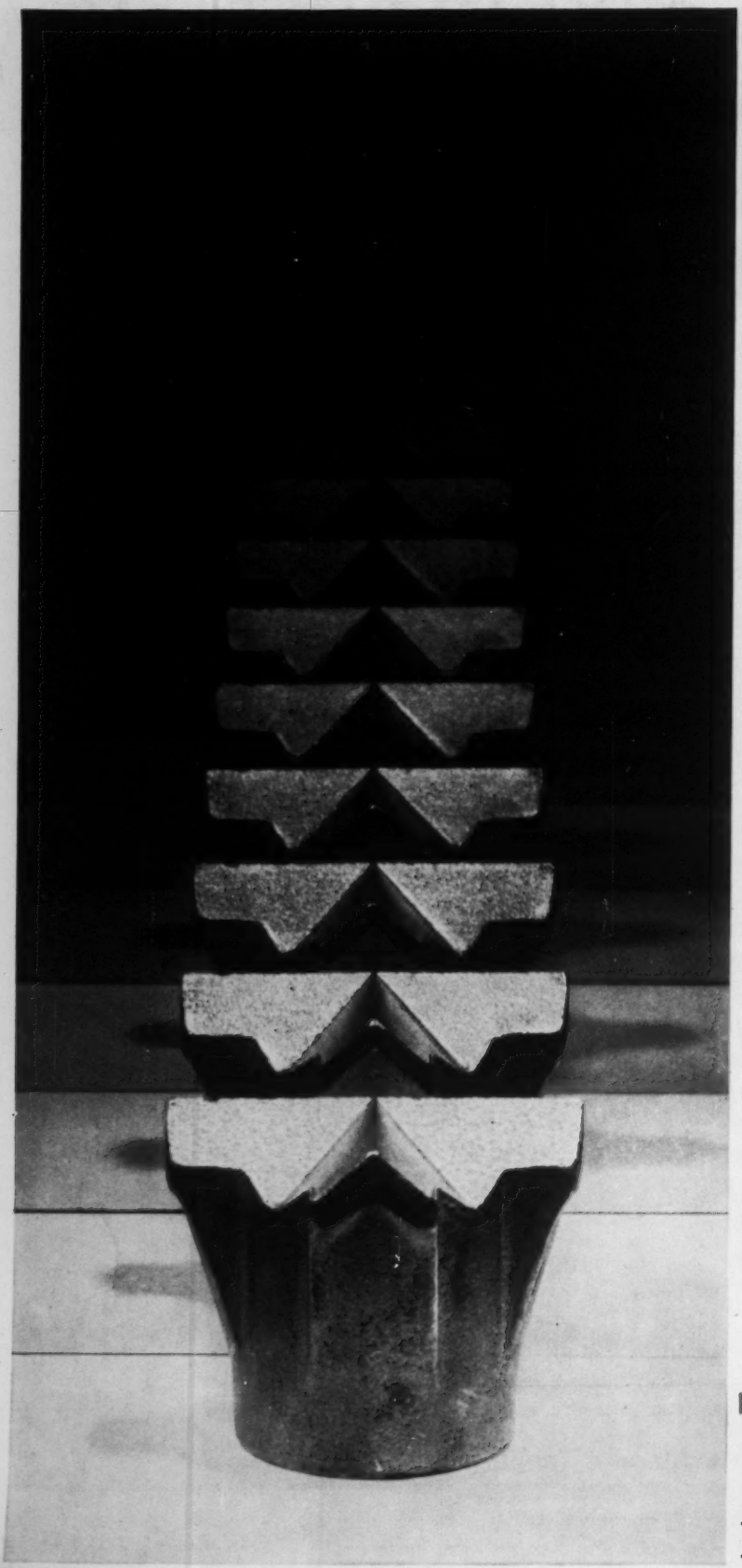
MANUFACTURING COMPANY

MACHINE DIVISION – TORRINGTON, CONNECTICUT



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